ELECTRICAL TIMES

THURSDAY
5 APRIL
1951
SIXPENCE

Simplify cable erection with BICC CLAW-TYPE CLEATS

BICC Claw-Type Cleats are a new invention, devised by our engineers, to make cable installation rapid and easy.

Light and strong, they consist of interchangeable units made from a corrosion-resisting alloy.

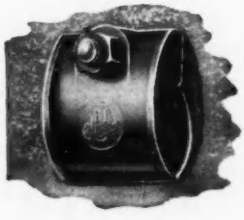
They minimise the need for special steelwork;

Are compact and space saving;

Solve cleating problems in difficult situations;

Provide for extensions and adaptations with minimum disturbance of existing cables,

And allow maximum accessibility to cables on multi-cable runs.



For further information, send for Publication 287*N*

B.I. Callender's

CLAW-TYPE CABLE CLEATS

(Patent applied for)

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

Just wish...

..and it's yours!

How convenient to have such a magical delivery service now that the reduction in Purchase Tax is stepping up demand. But the B.N.E. service is nearly as good—stocks of *Charlton* Electric Water Heaters are held at B.N.E. depots all over the country and your requirements can usually be met within a matter of hours. The range includes Non-pressure, Pressure, 'Twin' Dual-purpose, and Cistern type Storage Heaters and Immersion Heaters and Circulators—in fact a type for every domestic requirement. Ring your nearest B.N.E. depot* when you have an urgent order.

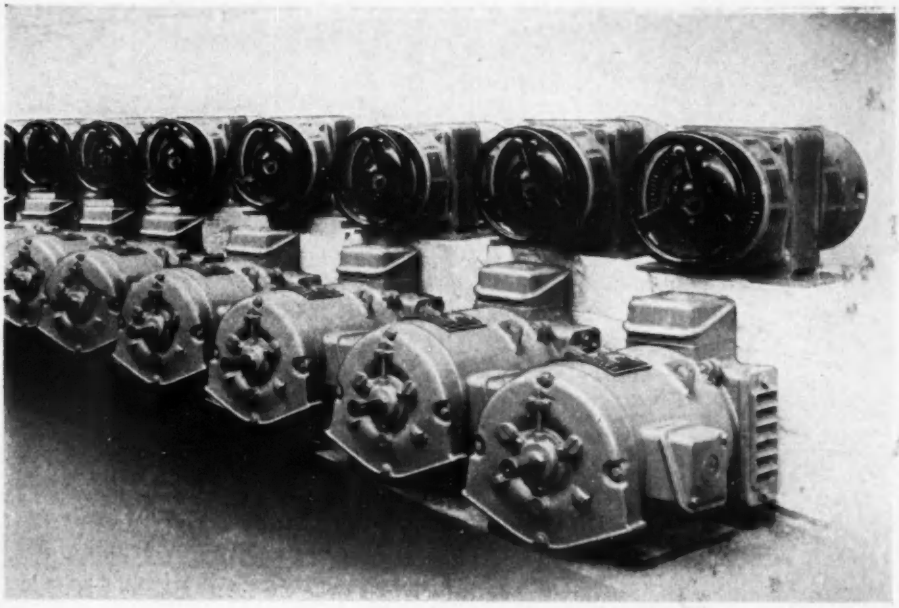
**There is one at your local J. & P. Branch.*

BRITISH NATIONAL ELECTRICS LTD.

The Domestic Appliances Section of JOHNSON & PHILLIPS LTD.

NEWARTHILL · MOTHERWELL · SCOTLAND

A B.N.E. Product



N-S motors (1-9 h.p. range) with hand controlled induction regulators

Call up the little N-S VARIABLE SPEED HORSES ★

Many makers and users of small machines have found that the N-S variable speed a.c. motor, with its ease of precise and infinite speed control between wide limits and its trouble-free performance, is just the motor they have been seeking. Very often it makes possible greater volume and improved quality of production, and soon starts paying handsome dividends.

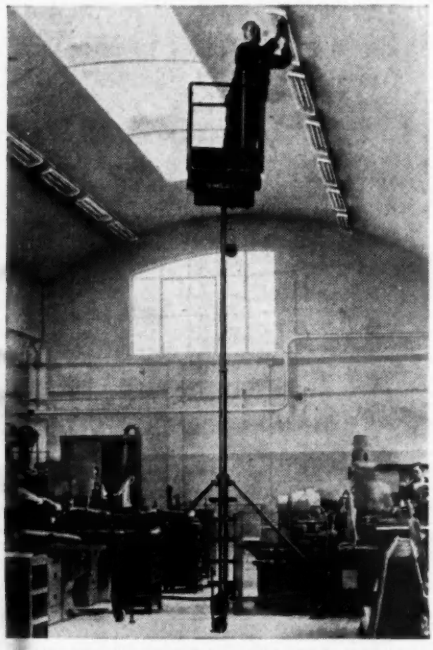
★ *Call them up in good time please—they are in brisk demand.*

LAURENCE, SCOTT
& ELECTROMOTORS LTD

Famous for thoroughbreds since 1883

NORWICH · MANCHESTER · LONDON & BRANCHES

A



CUT YOUR MAINTENANCE COSTS

with the famous

BEANSTALK

(Trade Mark

Maintenance of plant and buildings is safer and quicker—makes previously difficult places now easily accessible. Standard model provides the operator with a working height of 23-25 feet yet when retracted the BEANSTALK can be pushed through an ordinary small door. Alternative BEANSTALKS now available: 30 foot working height model, trailer type, baby model with 18 foot working height, and model with umbrella framework for conveying in small lifts. All models can be power operated if required. We will gladly demonstrate this equipment at your works by appointment.

Write for full illustrated particulars to:

WM. MOSS & SONS Ltd.

(Mechanical Developments Division), North Circular Road, Cricklewood, N.W.2. Tel. GLAdstone 8080

- HIGHER EFFICIENCY
- BETTER PRODUCT
- LOWER COST

Your Headroom Problems Solved

A moment's insight is worth an eternity of Labour

MORGAN

LIFTWAYS & POWERWAYS

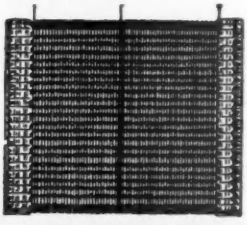
50 Wilkin St., N.W.5 Phone : GUL 1147

Write, call or phone for our Technical Representative's advice

ASBESTOS WOVEN

WIRE RESISTANCE NETS

Speedily supplied from stock, or 'made to measure' at a cost that will please you. Our Technical Service will help you with any problems.



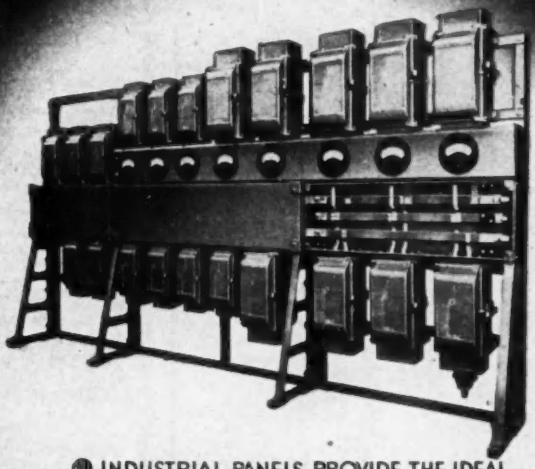
CRESSALL

Registered Trade Name of—

The CRESSALL MANUFACTURING CO., LTD

Tower Street, Birmingham 19

Telephone: ASTon Cross 2666 (3 lines). Telegrams: OMHIC, BIRMINGHAM



INDUSTRIAL PANELS PROVIDE THE IDEAL MAIN DISTRIBUTION FOR THEATRES, FACTORIES, HOSPITALS, HOTELS AND ALL PUBLIC BUILDINGS

INDUSTRIAL PANELS ENSURE THAT ALL SECTIONS OF AN INSTALLATION ARE UNDER ONE MAIN CONTROL

A SPECIAL TECHNICAL STAFF WILL ASSIST WHERE NECESSARY AND TENDERS WILLINGLY SUPPLIED TO YOUR OWN SPECIFICATION

BILL SWITCHGEAR LTD
ASTON LANE, PERRY BARR
BIRMINGHAM · 20

LONDON	BIRMINGHAM.	N.MIDLANDS.	S.MIDLANDS.	N.WEST.	SOUTH	SCOTLAND
A.W.ZELLEY & H.PRYKE.	C.BAKER.	G.H.GARBETT.	C.G.BACHELOR.	H.H.POLLARD.	W.L.WHITE.	J.D.HARRIS

'Stand and deliver' was a demand often heard in the time of Dick Turpin, one of Enfield's less popular visitors. Hold-ups still occur here today — not the cowardly designs of highwaymen — but hold-ups in raw material supplies (amongst other things) which prevent us from making all the fires and cookers we would like in order to satisfy the ever-increasing demand.

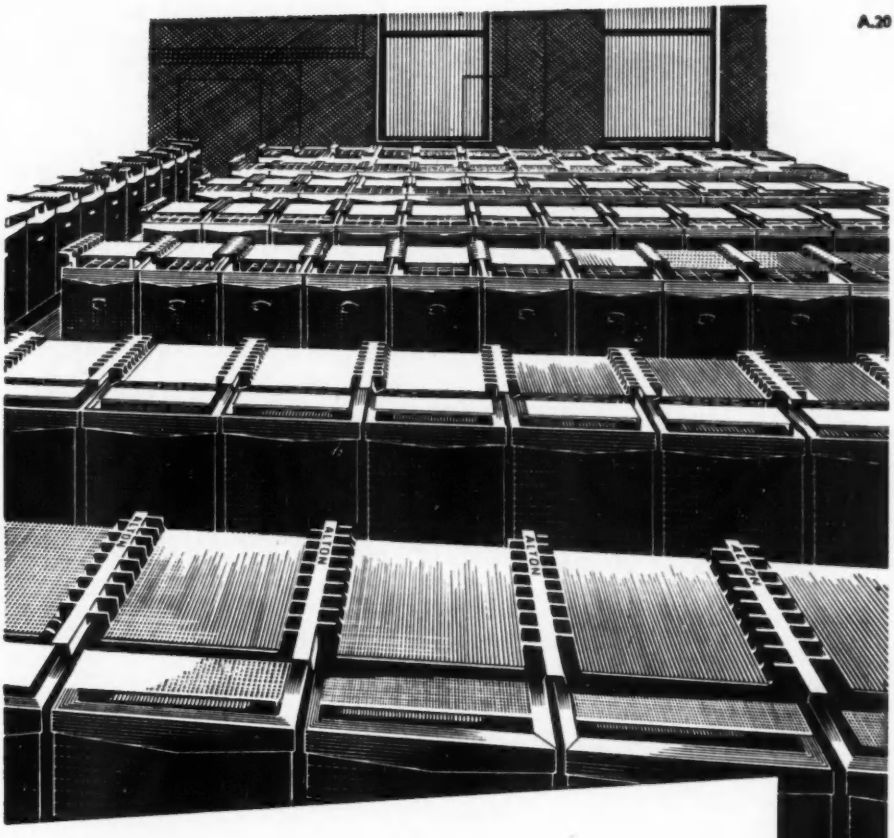
We are doing our very best to distribute our output fairly, and hope that it won't be so long before we too will be able to ' stand and deliver ' just what you want.

you can't beat a "Belling"

BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX. HOWARD: 1212

CRC369

A.20



Alton has been exporting batteries for thirty years. In installations in sixty-five countries Alton Batteries, in capacities from 10 to 15,000 ampere-hours, are giving the service only good batteries can give. Alton, in any language, means good batteries and firm delivery dates.

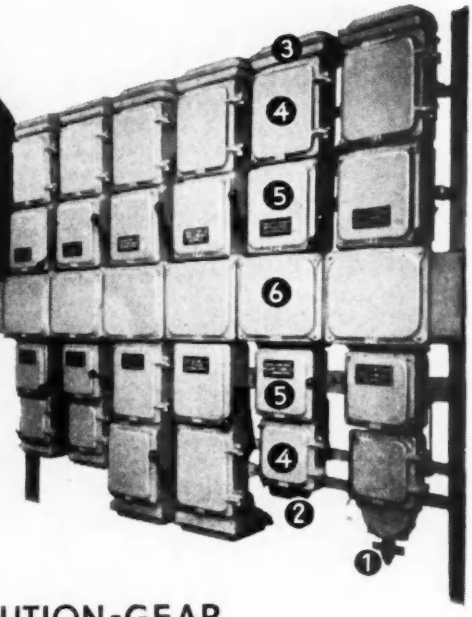
ALTON

BATTERIES OF MERIT

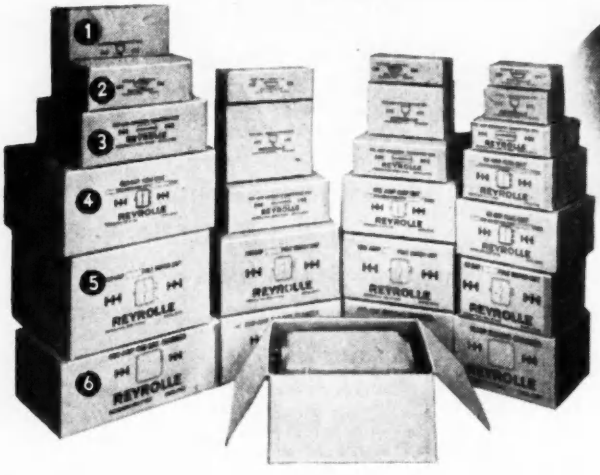
THE ALTON BATTERY COMPANY LTD
Alton, Hants: Telephone: Alton 2267 and 2268
Telegrams: Battery, Alton

Alton can also supply renewal plates for all makes of battery, British & Continental

Exports by Experts



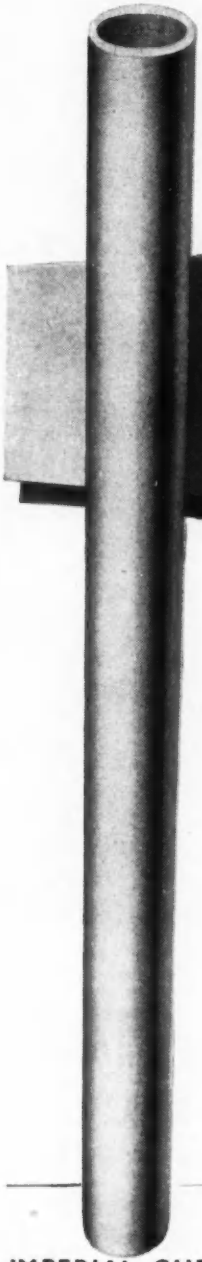
MEDIUM-VOLTAGE DISTRIBUTION-GEAR



Cartons used for stocks of units in Overseas offices

REYROLLE

HEBBURN CoDURHAM ENGLAND



ICI METALS DIVISION

are exhibiting
COPPER AND ALUMINIUM
and their alloys in

strip, sheet, plates,
tubes, rods, sections,
wire and sundries

BIF 1951 BIRMINGHAM APRIL 30—MAY 11

STAND No. D409-308

IMPERIAL CHEMICAL INDUSTRIES LTD., LONDON, S.W.I

M.214

ELECO

SPECIALISTS IN *Modernised*

INDUSTRIAL • COMMERCIAL • STREET LIGHTING

Modern lighting is work for the specialist. That is why it pays to consult E.L.E.C.O. — the specialists with over 50 years' experience in the design and manufacture of all types of Industrial, Commercial and Street Lighting fittings.

Street Lighting Fittings of outstanding design for all types of lamps; Tungsten; electric discharge; fluorescent lamps; industrial and commercial lighting fittings; vitreous enamelled reflectors of all types; cast iron, Watertight and Bulkhead fittings; street lighting columns; raising and lowering gear; switches.

ENGINEERING & LIGHTING EQUIPMENT CO. LTD.

SPHERE WORKS • ST. ALBANS • HERTS

Telephone : St. Albans 2258/9 Telegrams : VOLTARCON, St. Albans

TECHNIQUE *for laying*

J.&P. SEAMLESS

ALUMINIUM

BRITISH PATENT NOS. 627815 & 627793

SHEATHED CABLES

... IN TRENCHES

The inherent tensile strength of aluminium permits J. & P. Aluminium Sheathed Cables to be laid in open trenches by a simple method which frequently offers a saving in labour.

The recommended procedure is to place cable rollers in the trench at intervals of eight feet or more, those around bends in the trench being placed on their sides. Adjacent to the first few rollers, bars or picket pins should be driven into the trench bottom in pairs close up to the cable to act as guides. A draw rope is attached to the end of the cable by means of a cable stocking and the cable drawn straight off the drum into the trench by hand haulage on the rope or by a winch if available. An improvised brake consisting of a plank of timber should be used to apply some friction to a flange of the drum. It is unnecessary to handle the cable directly during the running-out process, and in fact this should be avoided. It will be found that the cable will lie quite straight in the trench.

By the method outlined a small labour force is able to lay very large aluminium sheathed cables.

JOHNSON & PHILLIPS LTD.

CHARLTON LONDON S.E.7

The mark that means that "little more" in quality

...ok ...
...f M. Pleven
...statesmen and
...d with general
...les and in the
...nfident tone of
...ed in Washing-
...on that the visit
...dispel the mis-
... grown up in
... two countries,
...tige beyond the

...wever, betrays a
...e nature of the
...on and suspends
...ails of the talks
...gnificant in this
...ve so far been
...ral atmosphere
...lks with Presi-
...olitical leaders.
... being notable
...anco-American
...ng after under-
...nsion at Lake

...HINA

...ot expect any
...ter's visit, and
French opinion
...d if it merely
squarely before
and to secure
foreign policy.
...er, it was hoped
...itive advantages
in dealing with
...nals.
...note that military
expedited," but
talks makes no
support in the
Le Monde says
...cial statements
...aterials must be
..." that one is
...uals, and that
...fore they are
...per, *L'Aurore*,
...nt way by say-
...e Washington
are entitled to
... do not remain

...SSED

...ty at the com-
...e Minister may
... to amount to
...rican policy in
...Franc-Tireur is
...e alignment on
...en gave the im-
...way of reinforc-
...is made up
...at a time whe
...ndence whic

...ading Dr. Melville Mackenzie, the British representative, expressed doubts about the wisdom of asking Governments for increased contributions. Such unrealistic action, he said, might lead Governments to withdraw their support altogether.

...INDWARD AN... ...EEWARD IS...

The King has approved the appointment of Mr. Donald Edward Jackson, puisne judge of the Windward and Leeward Islands, to be Chief Justice of the Windward and Leeward Islands, in succession to Sir Clement Malone, who has recently retired.

Bundesrat to-...

It is not lik... through Parlian... trialists are ex... Bavarian repres... of the German... protest on the gr... is contrary to h... what co-determi...

In the Parlia... perhaps more d... vice of the Fr... an essential ele... to-day more ... trade unions ... trusted leader...

The commer... chose their m... for their deci... democracy in ... in its defence a... east. It goes ... " social Fasc... is fustian wh... that co-deter... Government ...

PRI...

As drafted, ... to undertakin... persons or h... than 1m. D. ... unions the a... recognizes co-d... ing more than ... Bill may have b... which it is hope...

Herr Störch, ... to-day that th... regarded as a ... heavy responsi... new influence ... industry. The ... to contemplate ... not prepared t... The Governm... new between lib...

Herr Storch ... might be electe... replied that tha... unions. It is n... may be elected ... councils have th... choosing the w... boards, and al... little say in th... are extremely ...

CANAD... R...

...VEEDSM... FROM ...

...he first st... ...aluminiu... ...ch ...

FUEL SHORTAGE—WARNING

Stocks of coal are dangerously low.

A serious shortage will close factories, cause unemployment and bring hardship to your home.

ACT NOW

by using less

COAL GAS ELECTRICITY

Issued by the National Coal Board, the Gas Council and British Electricity in support of the Ministry of Fuel & Power campaign

EVERYONE is being asked to save coal, gas and electricity and the efforts of the nation must not be wasted in the factories.

In every factory fuel must be used to the greatest effect and economies made wherever possible.

***Your* extra care will help to keep industry working.**

The wreckage of an aircraft was found to-day in the sea south-east of Reykjavik. It is believed to be that of a Dakota which crashed near Reykjavik last night in a blizzard. There were 20 persons on board the aircraft, which...

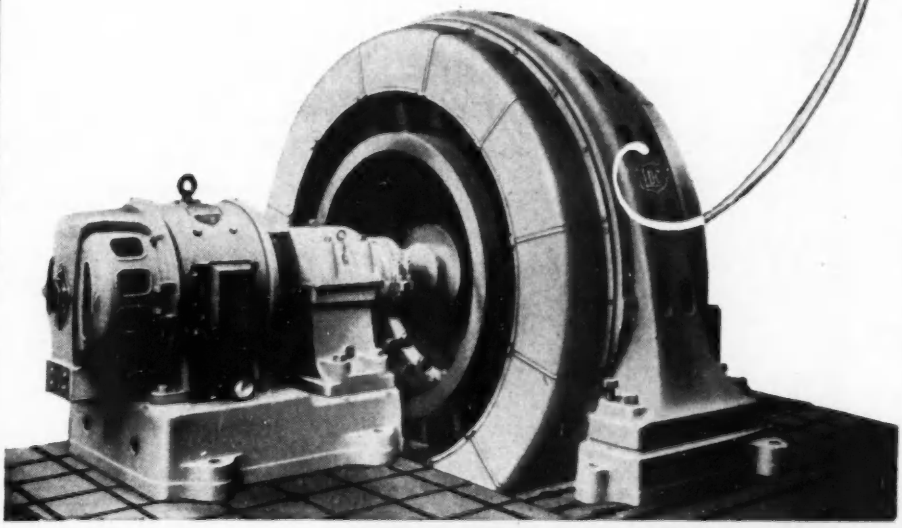
There was another atomic explosion to-day at the Atomic Energy Commission's testing ground in Nevada. Like the...

LANCASHIRE·CRYPTO

The Symbol of Power in Industry for over 50 Years

There is an L.D.C. motor of the correct enclosure, including Flameproof, for any industrial situation.

Illustration: L.D.C. Alternator with Exciter, continuously rated at 1,495 kW, 400 r.p.m., 6,900 v. 60 cycles 3 phase. Supplied to Ruston & Hornsby for Crown Agents, Bahamas.



One of the IDH *Group*

LANCASHIRE DYNAMO AND CRYPTO

TRAFFORD PARK MANCHESTER 17 WILLESDEN LONDON N.W.10

BIF 1951

APRIL 30—MAY 11
CASTLE BROMWICH
BIRMINGHAM

SEE OUR EXHIBIT

STAND No.
D 543

Electrical Accessories of Quality

SPERRYN & CO
MOORSOM STREET WORKS
BIRMINGHAM 6

LEGG TWO-RATE RECTIFYING EQUIPMENT

FOR USE WITH SWITCH TRIPPING BATTERIES

Illustrated here is the Legg Two-Rate Rectifying Equipment for use with 115 lead acid cells capacity 150 ampere-hours and having the following outputs—
Quick charge plus floating load 10/11.5 amps adjustable between 230/316 volts.
Trickle charge plus floating load 100 m.a./1.5 amps adjustable between 247/276 volts.
Legg Industries design and manufacture rectifying equipment for all purposes where metal rectification can be used.

Legg (INDUSTRIES) LIMITED

WILLIAMSON STREET · WOLVERHAMPTON

Even during power cuts—

UP TO 20%

MORE LIGHT

THEY consume no extra current, they cost little more than an ordinary bulb — but they give up to 20 per cent more light! Those are the impressive facts about Philips coiled-coil filament lamps, available in Pearl and Clear ranges in 40, 60, 75 and 100 watts and 40, 60 and 100 watts in Argenta. The coiled-coil is doubly spiralised, which exposes a smaller surface to the cooling action of the gas filling, and so wastes less heat. In these days of low voltages, your customers cannot fail to be impressed by this *increased efficiency*.

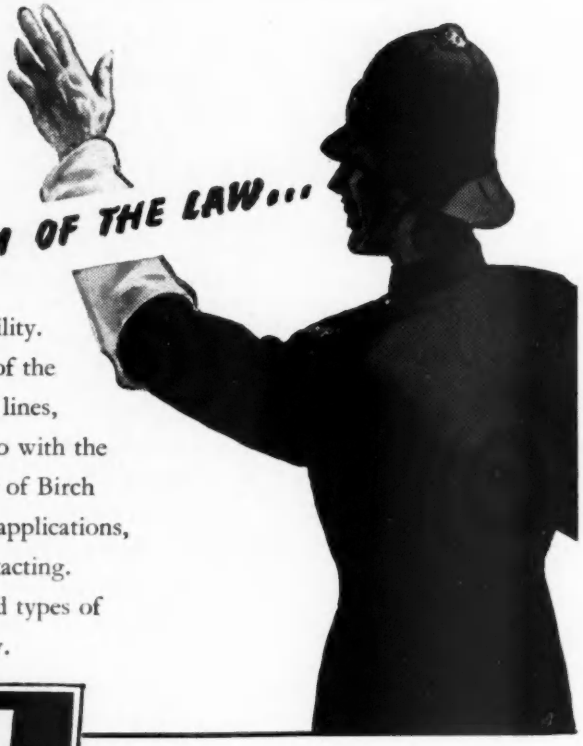
PHILIPS ELECTRICAL
LIMITED

LIGHT GROUP, CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2.

Makers of: THE DEPENDABLE RADIO · TELEVISION RECEIVERS · LAMPS AND LIGHTING EQUIPMENT "PHILISHAVE" ELECTRIC DRY SHAVERS · CYCLE DYNAMO LIGHTING SETS · AMPLIFIERS, ETC.
(L.787)

"P. C. BIRCH"

ready for any 'Resistance' . . .



and famous for his Reliability. Like the proverbial 'arm of the law' he is built on robust lines, which has quite a lot to do with the amazing life and efficiency of Birch Resistances in their many applications, so various and often so exacting. Note the range of standard types of Resistances outlined below.

Birch *Resistances*

Registered Trade Mark

DIMMERS—REGULATORS (Field, Shunt, Voltage)
RESISTANCES (Arc Lamp, Charging, Regulating, Sliding)
RHEOSTATS—ELEMENTS and SPIRALS
ASBESTOS WOVEN Resistance Nets and Grids

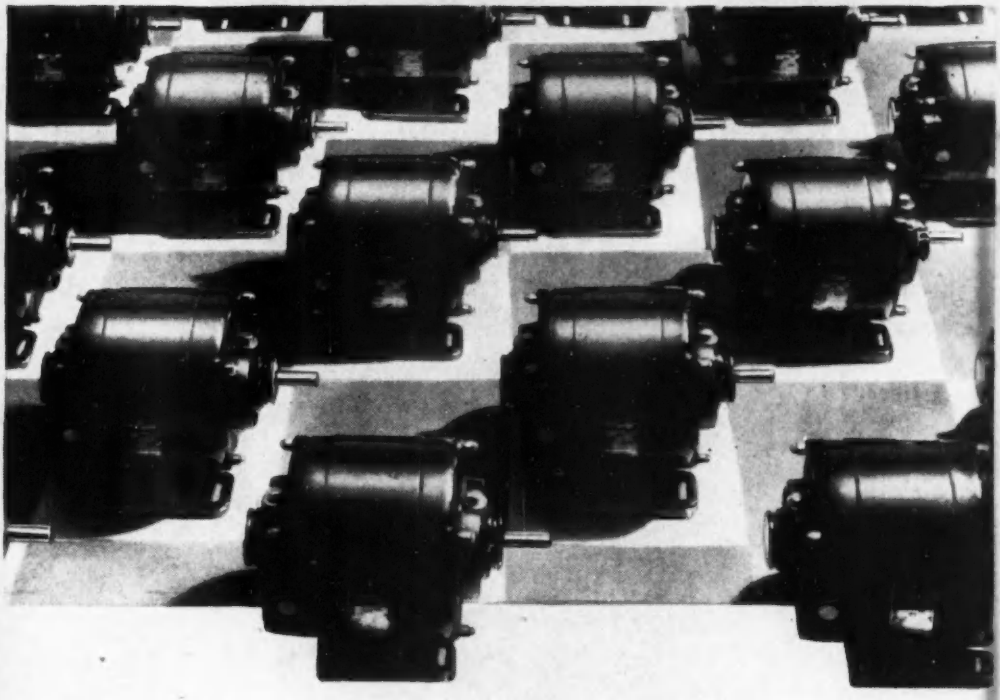
ARMS OF THE OHM'S LAW

All Resistance problems come within our scope. Please call on us to help you solve any problem which may arise.

H. A. BIRCH & CO. LTD. Wilohm Works, Wood Street, WILLENHALL, STAFFS.
Telegrams: "WILOHM" Willenhall. Telephone: Willenhall 494-495
London Office: 33, Sudbury Court Road, Harrow. Tel.: ARNold 2694

B.R.2

ECONOMIC POWER
for immediate employment



Metrovick fractional hp. motors

Britain's economic position demands the most efficient use of every unit of power—even that from the smallest fractional h.p. motor.

To gain maximum efficiency from the electric power used in your plant you cannot do better than specify motors by Metrovick. Made in sizes from 1/50 to 25,000 h.p. and upwards. Supplied ex-stock or on short deliveries.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17
Member of the A.E.I. group of companies

METROVICK *motors for every phase of industry.*

APRIL 30 –MAY 11

An International market place

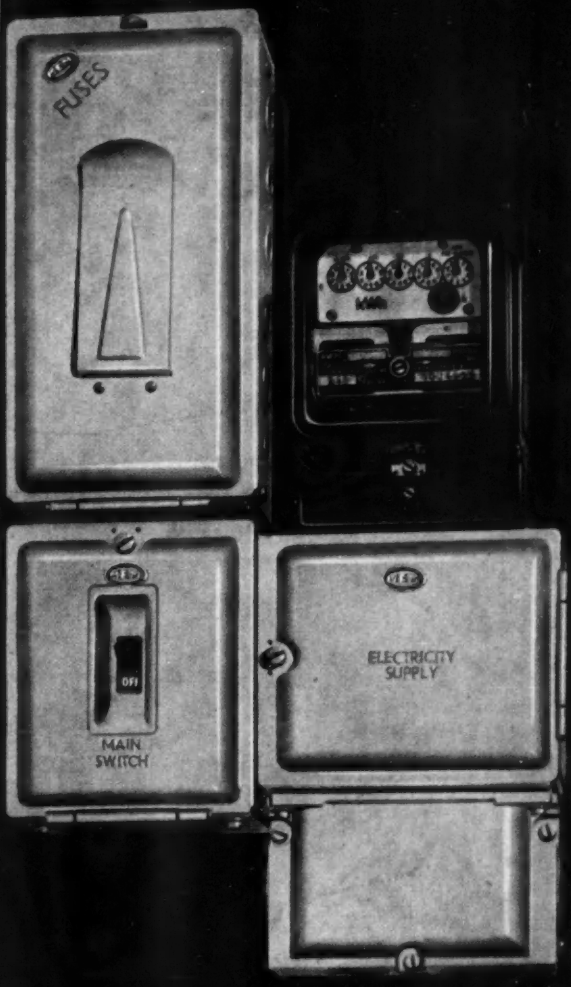
In size and significance the British Industries Fair this year will surpass all its twenty-nine predecessors.
To buyers from every part of the world this vast display will demonstrate Britain's increasing capacity and industrial enterprise.

BIF means business!

LONDON—EARLS COURT AND OLYMPIA. Weekdays 9.30 a.m.—6 p.m. Buyers Badges and Catalogues 2/6 each, obtainable at Fair. Public admitted Saturday and Wednesday (May 5 and 9) 1/6 each building.

BIRMINGHAM—CASTLE BROMWICH. Weekdays 9.30 a.m.—6 p.m. Buyers Badges and Catalogues 2/6 each, obtainable at Fair. Public admitted daily from 2 p.m. (all day Saturday) 2/6.

ELECTRICAL EQUIPMENT
AT CASTLE BROMWICH



Have you seen

MEMERA

the latest in consumers' control units?

MEM

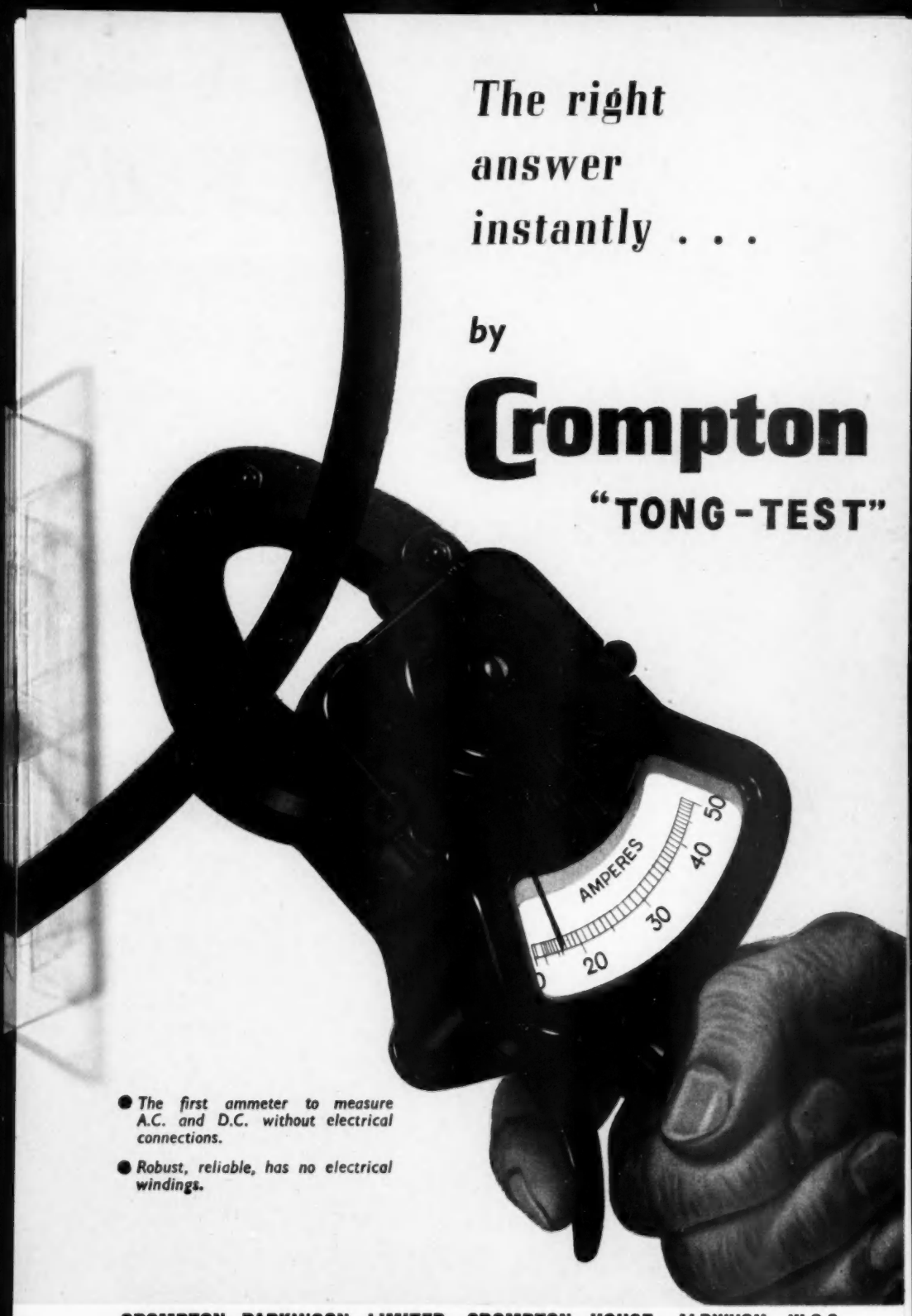
MIDLAND ELECT

The right answer instantly . . .

by

Crompton

"TONG-TEST"



- *The first ammeter to measure A.C. and D.C. without electrical connections.*
- *Robust, reliable, has no electrical windings.*

CROMPTON PARKINSON LIMITED CROMPTON HOUSE, ALDWYCH, W.C.2.

Phone : CHAncery 3333 *'Grams : Crompark, Estrand, London*

SIEMENS

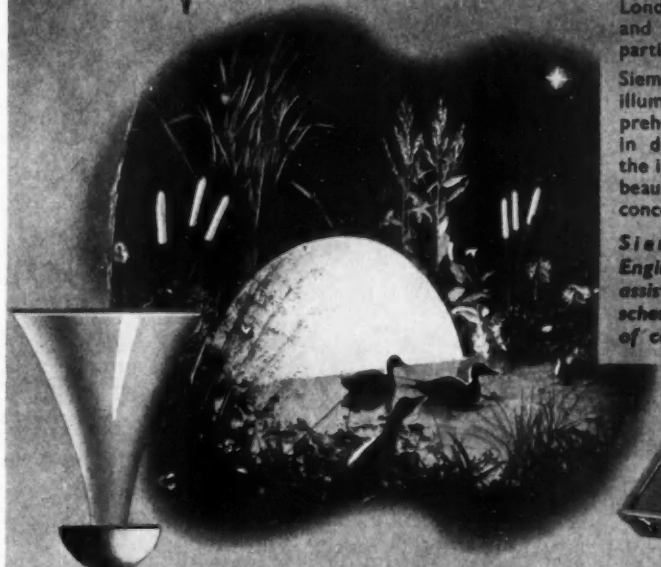
Festival Illuminations

1951

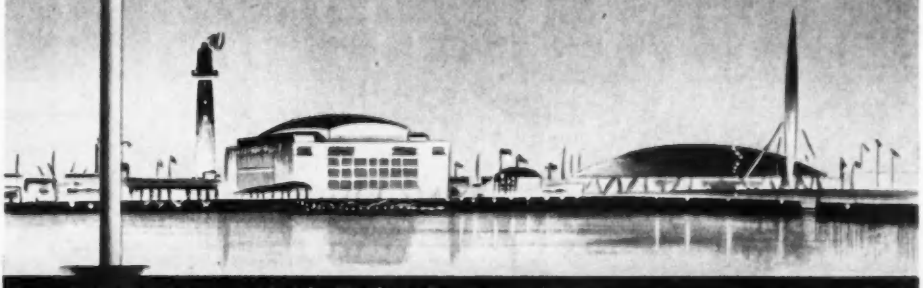
LIGHTING will play a most important part in the Festival of Britain, not only in London but in every City, Town and Hamlet which wishes to participate in the celebrations.

Siemens offer a variety of illuminated effects, in a comprehensive range of Floodlights, in decorative devices and in the illumination of the natural beauties of parks by means of concealed lighting.

Siemens' Illuminating Engineers will be pleased to assist in the preparation of schemes, without obligation of course.



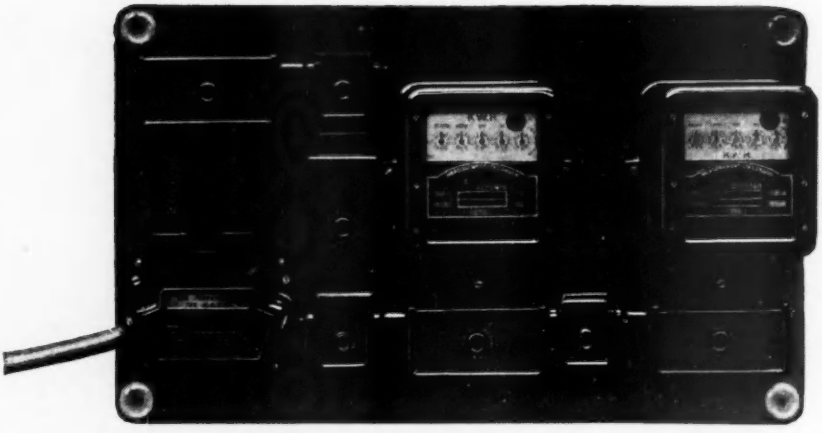
Write for Brochure No. 1007



Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4

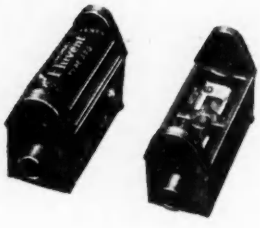
Branches at Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield.

B



DOMESTIC HARMONY

EXPRESSED IN TERMS OF DISTRIBUTION



This typical arrangement, incorporating Aeroflex House Service Cut-Outs and Fluvent Meter Trunking is a guarantee of long trouble-free life. The Aeroflex Service Cut-Out can now be supplied with the Aeroflex AFSK 60 amp. fuse bridge equipped with Aeroflex Ceram CSK 60 amp. cartridge fuse links. This complies not only with BS 88, cat. 440 AC4 but, in dimensions, with BS 1361. These cartridges are consequently interchangeable with other makes to this Specification.

INCORPORATING

PARMITER, HOPE & SUGDEN LIMITED

FLUVENT Electrical Works, Longsight, MANCHESTER 12

London: 34 Victoria St., S.W.1. Glasgow: 162 Buchanan St., C.1

dm PH 28

NOMAG RESISTANCE GRIDS

This illustration shows banks of Ferranti Nomag resistance grids installed in one of the 15-3,000 H.P. 3,000 volt electric locomotives built by the English Electric Co. Ltd. and the Vulcan Foundry Ltd., for use on the Estrada de Ferro Santo a Jundiai, Brazil.

When the electrification of railways was undertaken in this country and abroad, many difficulties were encountered in providing suitable heavy duty resistance grids. Ferranti Nomag however provided the answer to most of the problems involved. The high specific resistance and excellent properties of resistance to mechanical and thermal shock prompted the English Electric Co. Ltd. to specify Ferranti Nomag resistances for the locomotive illustrated.

FERRANTI NOMAG

Non-Magnetic CASTINGS

High Specific Resistance	150 micro-ohms per $Cm.^2$
Low Resistance Temperature Co-efficient	·00045 per °C.
Physical Toughness (Izod Value)	29 ft. lbs.
MAX. Magnetic Permeability	1·03 lines/$Cm.^2$

Good Machining Properties.

FAB

FERRANTI LTD., HOLLINWOOD, LANCS. London Office: Kern House, Kingsway, W.C.2.

R·E·A·L

Present their Range of Flood Lanterns for the Festival of Britain

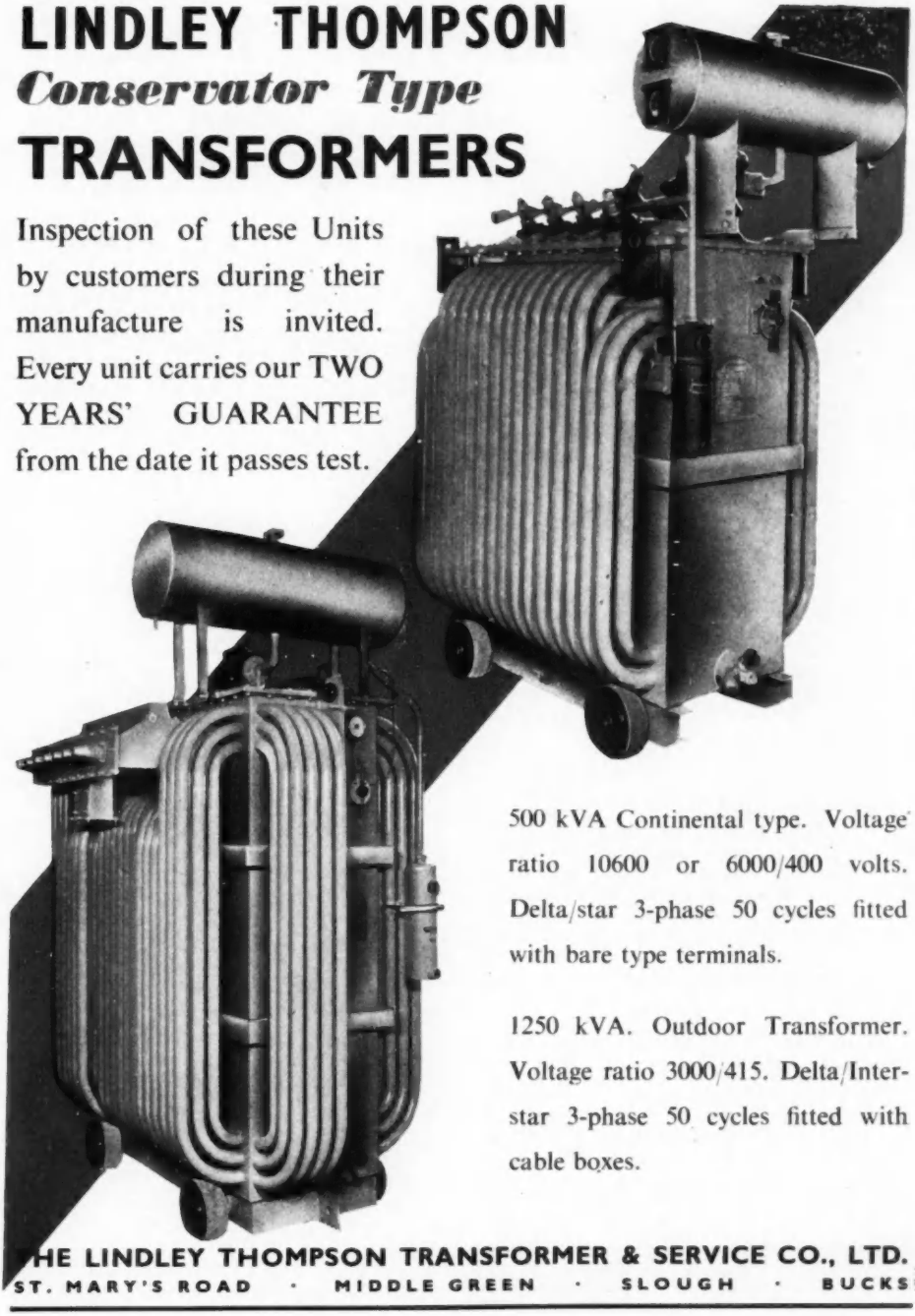
The 'Festival' model illustrated below is but one of the comprehensive range of R.E.A.L. flood lanterns which cover practically every flood lighting requirement.

Copies of our new publication "R.E.A.L. Flood Lanterns" are now available.

Issued by ROWLANDS ELECTRICAL ACCESSORIES LTD • R.E.A.L. WORKS, BIRMINGHAM 18

LINDLEY THOMPSON
Conservator Type
TRANSFORMERS

Inspection of these Units by customers during their manufacture is invited. Every unit carries our TWO YEARS' GUARANTEE from the date it passes test.



500 kVA Continental type. Voltage ratio 10600 or 6000/400 volts. Delta/star 3-phase 50 cycles fitted with bare type terminals.

1250 kVA. Outdoor Transformer. Voltage ratio 3000/415. Delta/Inter-star 3-phase 50 cycles fitted with cable boxes.

THE LINDLEY THOMPSON TRANSFORMER & SERVICE CO., LTD.
ST. MARY'S ROAD · MIDDLE GREEN · SLOUGH · BUCKS

"Count them as they catch your eye"

SANDERS "SUPERIOR"

In the shipyards North and South of the Tweed, British engineering skill at its finest is seen to advantage. Here, experience, craftsmanship, brain and muscle are co-ordinated in the men who build the most famous ships in the world, and with them the prestige of this little island.

It is not to be wondered at that in these tough and weathered surroundings one frequently sees — perhaps on some giant crane, possibly in an open yard, or hidden away in one of the workshops — the encircled Ⓢ and superscription of the Sanders Superior Switch ; a switch which for roughly thirty years has proved itself capable of carrying its full load indefinitely, frequently without any semblance of maintenance.

Count them as they catch your eye.

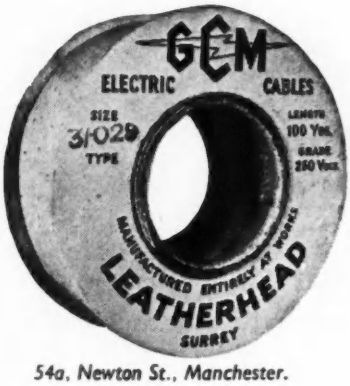
SANDERS
WEDNESDAY

Comprehensive stocks are carried by selected wholesalers in all large centres of population

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

YOU'RE NEVER FAR

55, Washington St., Glasgow.



54a, Newton St., Manchester.

FROM BIG STOCKS OF

204, Newhall St., Birmingham.

GENERAL CABLES

Leatherhead, Surrey.

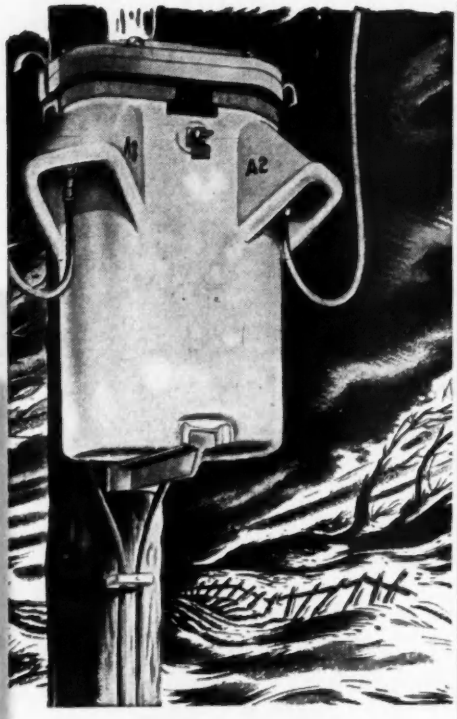
Comprehensive stocks of General Cables are held at Leatherhead, Birmingham, Manchester and Glasgow. Deliveries can be made at short notice through your usual wholesaler.

In case of difficulty write to

THE GENERAL CABLE MANUFACTURING CO. LTD.
LEATHERHEAD, SURREY.

TELEPHONE: Leatherhead 3021 (4 lines)
TELEGRAMS: Isolde, Leatherhead.

"GOOD CABLES TODAY PREVENT TROUBLE TOMORROW"



It isn't only the British weather

. . . that has proved British Power Distribution Transformers an outstanding success. All over the world—from the ice-bound Arctic to the heat and humidity of the tropics—the advantages of this easily installed, hermetically sealed, compact distribution transformer are recognised and appreciated. May we send you details and specifications? (Ask for leaflet BP302/3).

BRITISH POWER

DISTRIBUTION TRANSFORMERS IN HERMETICALLY SEALED STONEWARE CONTAINERS

BRITISH POWER TRANSFORMER COMPANY LTD.
Queensway, Ponders End, Middlesex.
Telephone: Howard 1492 · Telegrams: "Vitrohm, Enfield"

B.P.3022 CV

The Consumer of DUST

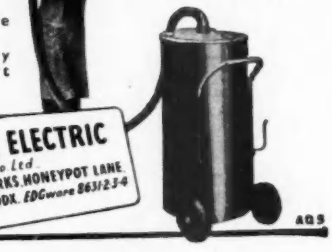
Secomak REGD

NEW MODEL 51 INDUSTRIAL VACUUM CLEANER

Unique design makes this, weight for size, the most economical and powerful portable Vacuum Cleaner available. One man operated, it is built for easy manipulation in confined spaces.

Apply for Leaflet 511/50/ET

Approved by Factory Inspectors.
Universal AC/DC power unit 1,200 watts.
110 lbs. weight.
Generous size pneumatic tyres.
Large capacity internal dirt container.



SERVICE ELECTRIC Co Ltd
SECOMAK WORKS, HONEYPOT LANE, STANMORE, MIDDX. EDGware 8631-2-3-4

AQ 5

LAMP BREAKAGES REDUCED!

A new Best Seller

The Marlboro' BALL SOCKET COUPLING & ANTI-VIBRATOR

The BALL SOCKET COUPLING (earthed) has a loose quarter spherical sleeve, giving the whole pendant a very easy and smooth action and allowing a greater swinging movement. Retails at **3/-**

• USUAL TRADE TERMS •

The ANTI-VIBRATOR (earthed); similar to the above, incorporating a special felt pad which effectively damps down the vibrations which would otherwise go direct to the lamp filament. Retails at **3/9**

★ Send for leaflet. ★ Samples on request.

J. E. WILDBORE Ltd. PETER ST. OLDHAM
TEL: MAIn 4475
• 43 YEARS LIGHTING SERVICE •

Talking about
MAINTENANCE

If all cookers were

Jackson

ELECTRIC COOKERS

maintenance work would

have no future for us!

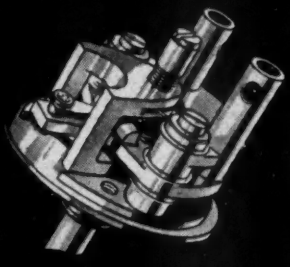
The Jackson Cooker is such a first class engineering job that it demands absolutely minimum attention where maintenance is concerned. In several areas there are many " 20 Series " Models — made in 1922 — still on circuit. — Think of it, 27 years of daily service! In 1939, of all cookers sold, over 40% were Jackson. To-day, as always, the Jackson ' Cleanline ' series still serves the engineer faithfully. The solid cast iron and heavy gauge steel construction — the design of the oven and elements which permits an amazing food capacity for an oven of its size — the quality of the vitreous enamel, which is second to none — all combine to make a Jackson the obvious choice for Hire and Hire Purchase Schemes. Low in maintenance cost — low in fuel consumption and thoroughly perfect in cooking. Ask any Maintenance Engineer who has thousands to look after and you will learn why Jackson have made and ***sold over half a million cookers.*** *Supplied in three attractive colours, mottled grey, mottled green and two tone ivory. The ' Cleanline ' series complies with E.D.A. interchangeability and specifications.*

THE JACKSON ELECTRIC STOVE CO., LTD.

143 Sloane Street, London, S.W.1. SLOane 6248

Water heater thermostat

WITH A DIFFERENCE



An all-in-one-piece electrical circuit (instead of innumerable screw contacts)—a positive action, Simmerstat-type switch—sooner or later these are going to make a difference to your maintenance costs . . . ?

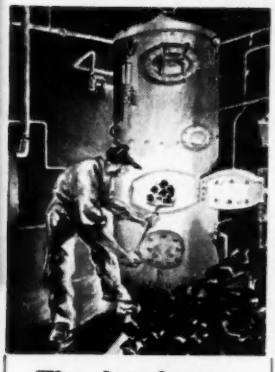
SUNVIC

Domestic temperature controls

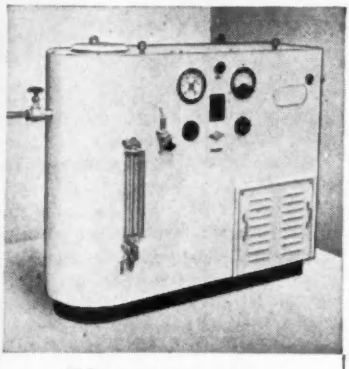
SUNVIC CONTROLS LTD. SUNVIC HOUSE, ESSEX STREET, STRAND, LONDON, W.C.2
Member of the A.E.I. Group of Companies

TAS/SC. 263

RAISING STEAM . . .



The hard way

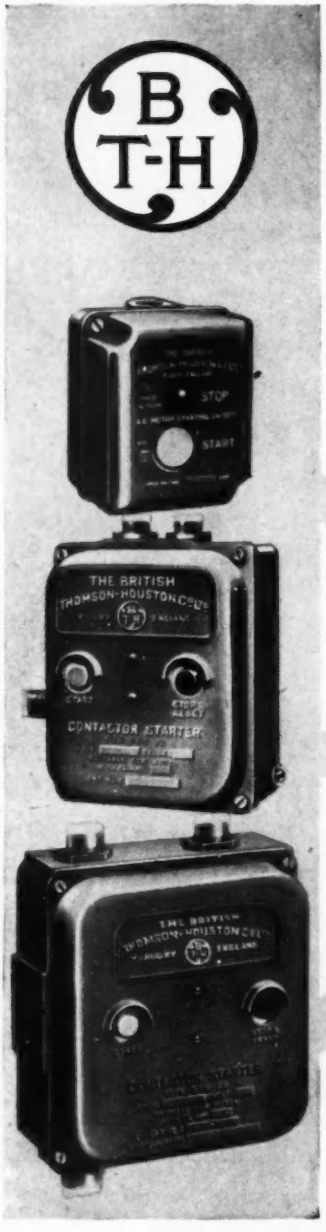


The easy way

. . . in the past entailed not only the disadvantages of fumes and smoke from furnaces but the construction of chimneys, boiler-houses and capacious fuel storage occupying much extra space, also fuel elevators and mechanical stoking devices. But all that is done away with where the new AUTOLEC ELECTRODE STEAM RAISER is installed. Comparatively small, compact, clean, it needs no special housing building, no fuel storage or chimney. Automatically controlled, it produces maximum steam output in a few minutes starting cold, and maintains it without attention with 98% efficiency—the highest ever achieved.

Switch to AUTOLEC *ELECTRODE* **STEAM RAISERS**

DESIGNED AND MANUFACTURED BY **G. W. B. ELECTRIC FURNACES LTD.** DIBDALE WORKS, DUDLEY. WORCS.
Proprietors: GIBBONS BROS. LTD AND WILD-BARFIELD ELECTRIC FURNACES LTD.



DIRECT-ON-LINE STARTERS

for Squirrel-cage Induction Motors

Compact in size and robustly constructed, these starters protect the motor from harmful overheating, whilst ensuring maximum continuity in service.

THREE-PHASE RATINGS

D.57-E

1/2 H.P. (100/250 v.),
1/2 H.P. (346/380 v.),
1/2 H.P. (400/550 v.).
Dimensions: 4 3/4" high x 3 7/8" wide x 3 1/4"

DOC. 70

3 H.P. (200/250 v.),
4 H.P. (346/380 v.),
5 H.P. (400/550 v.).
Dimensions: 7" high x 5 5/8" wide x 4"

DOC. 90

3 H.P. (200/250 v.),
5 H.P. (346/380 v.),
7 1/2 H.P. (400/550 v.).
Dimensions: 7 7/8" high x 7 1/8" wide x 4"

DELIVERY FROM STOCK

No manufacturer can offer a wider range of motor-control gear—hand or automatic, rheostatic or electronic—than BTH.

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

A4184

Member of the AEI group of companies

VISIT OUR STAND No. C.511/410 B.I.F. CASTLE BROMWICH.

'ENGLISH ELECTRIC'

mercury-arc rectifiers

3,000 v. Pumpless Rectifiers in Traction Service

Electrification of the Brazilian Estrada de Ferro Santos a Jundiai was completed by 'English Electric' in 1950. Fifteen 3,000 h.p. 3,000 volts DC electric locomotives, the most powerful of their type yet built in Britain, three 3-car suburban trains, and all AC supply, transmission, signalling, converting and control equipment — including substation buildings — were supplied by the Company.

In this typical substation at Tiete, power is fed to the overhead conductors by two air-cooled, sealed steel-tank mercury-arc rectifier sets each rated 2,000 kW at 3,000 volts. Ultimate total capacity of the substations is 18,000 kW, of which 12,000 kW is installed, soon to be increased by a third 2,000 kW set at Tiete to meet increased traffic demands. This is believed to represent the first application of pumpless air-cooled steel-tank rectifiers for main line traction duty at 3,000 volts.

'English Electric' rectifier equipments in service range from the 36 kW unit for Istanbul University to a 27,810 kW installation for aluminium production, largest ever supplied by a British manufacturer.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Rectifier Substation Department : Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

HAVE YOU ANY PROBLEMS RELATING TO THE NEW I.E.E. REGS: 403 I, 404 J?

You have?
Then why not write us about them?

After all, Tenbyluxe and Tenby Pilot Surface Switches may go a long way towards solving your difficulties!

Tenby ELECTRICAL ACCESSORIES

MANUFACTURED BY S. O. BOWKER LTD.

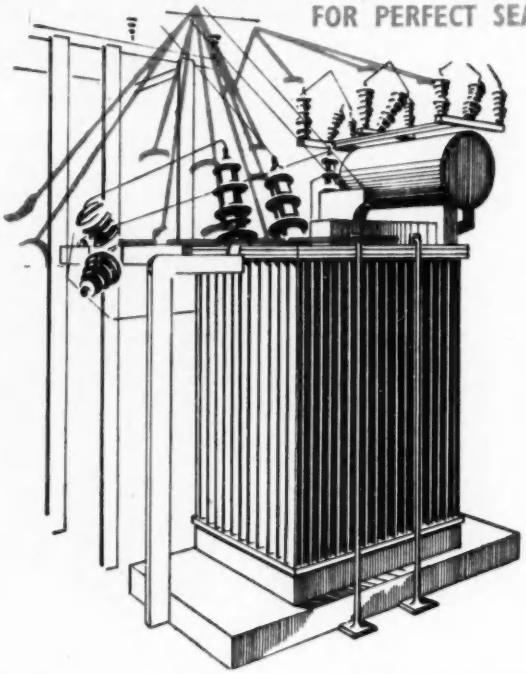
Birmingham:	19-21, Warstone Lane, Birmingham 18	Tel.: CENtral 3701
London:	54-56, Oxford Street, W.1	Tel.: MUSeum 4695
Manchester:	85, Mosley Street, Manchester 1	Tel.: CENtral 0051
Leeds:	5, Park Place, Leeds	Tel.: Leeds 23793

5627E

A Joint to forget Material to Remember

NEO-K-TEX

FOR PERFECT SEALING



- GASKETS
- WASHERS
- SHEETS
- MOULDINGS

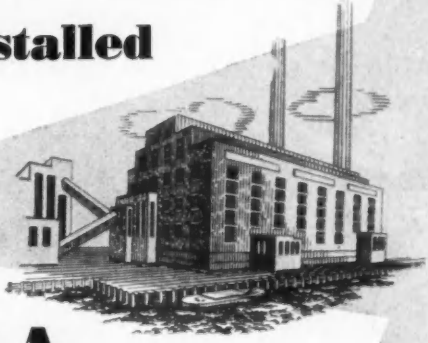
RESISTANT TO OIL, PETROL, WATER AND MOST INDUSTRIAL SOLVENTS

KAUTEX LTD. ELSTREE WAY ELSTREE · HERTS · *Tel.* ELSTREE 1777-8-9

BICC

CABLES and ACCESSORIES

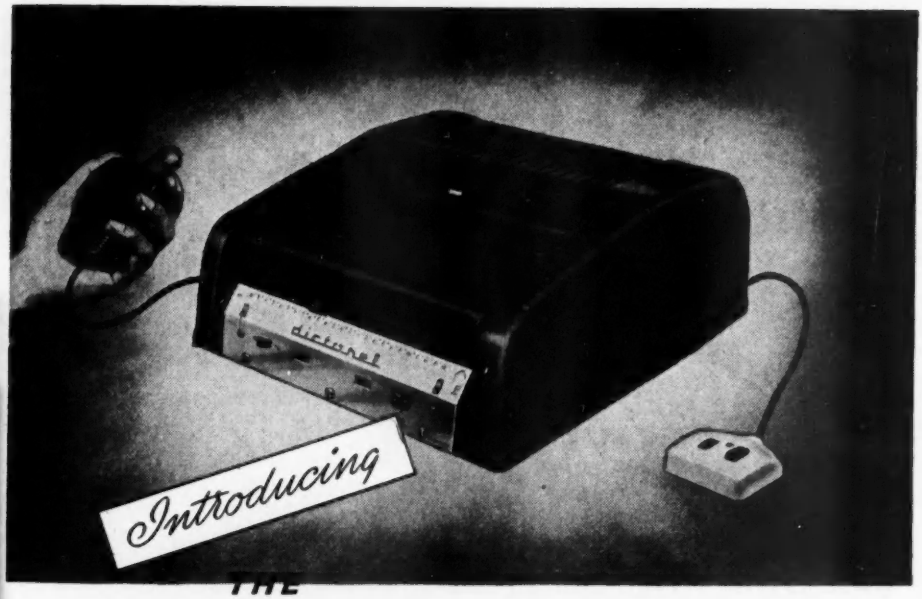
were installed in



18 B.E.A. POWER STATIONS during 1950

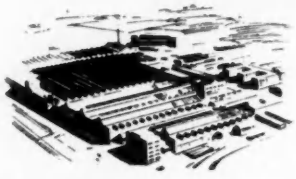
B.I. Callender's

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



THE

"DICTOREL"



- Magnetic Recording
- Dual Purpose
- Portable
- Ease of Control
- Long Life Chart
- Self-Indicating Carriage
- Any point of recording found immediately
- Measured back-spacing
- Chart can be mailed
- Elegance with dignity
- Chart duration—12 minutes
- Minimum maintenance
- New speech erases old—facilitates correction
- Records telephone calls

Exclusive Distributors for England and Wales:
The TREVOR-JOHNSTONE COMPANY Ltd.,
169/174 Sloane Street, London, S.W.1
Tel.: SLO 6198

Exclusive Distributors for Scotland:
LAND, SPEIGHT & Co., Ltd.,
73 Robertson Street, Glasgow, C.2
Tel.: Central 4955

An achievement of the Electronics Division of

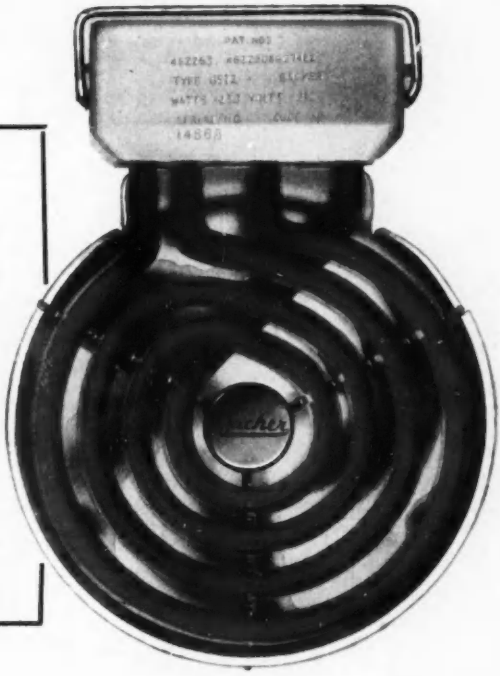
A.C.E.C. CHARLEROI

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI
(BELGIUM)

56, Victoria Street, London, S.W.1.

ANOTHER OF THE MANY

Backer BOILING PLATES



The 65 T2

This 2-circuit 6¼" diameter Radiant Plate is ideal for any size of utensil. With a maximum loading of 1150 watts it is the fastest and most economical plate of its type ever offered. The central tube is confined within a radius of 4⅜" diameter with a loading of 800 watts, to cater for quick boiling of milk, eggs, etc.

For use on AC or DC supply with 3-heat switch control, or on AC only if fitted with a single or 2-circuit "Simmerstat" or any similar type of control

Always specify "Backer" Plates in your cooker

BACKER ELECTRIC CO. LTD., FITZWILLIAM ROAD, ROTHERHAM, YORKS.

POWER FROM PROCESS STEAM · POWER FROM PROCESS STEAM · POWER
OM PROCESS STEAM · POWER FROM PROCESS STEAM
SS STEAM · POWER FROM PROCESS STEA
POWER FROM PROCESS STE
OM PROCESS STEA
SS STEAM · POWER
POWER FROM PRO

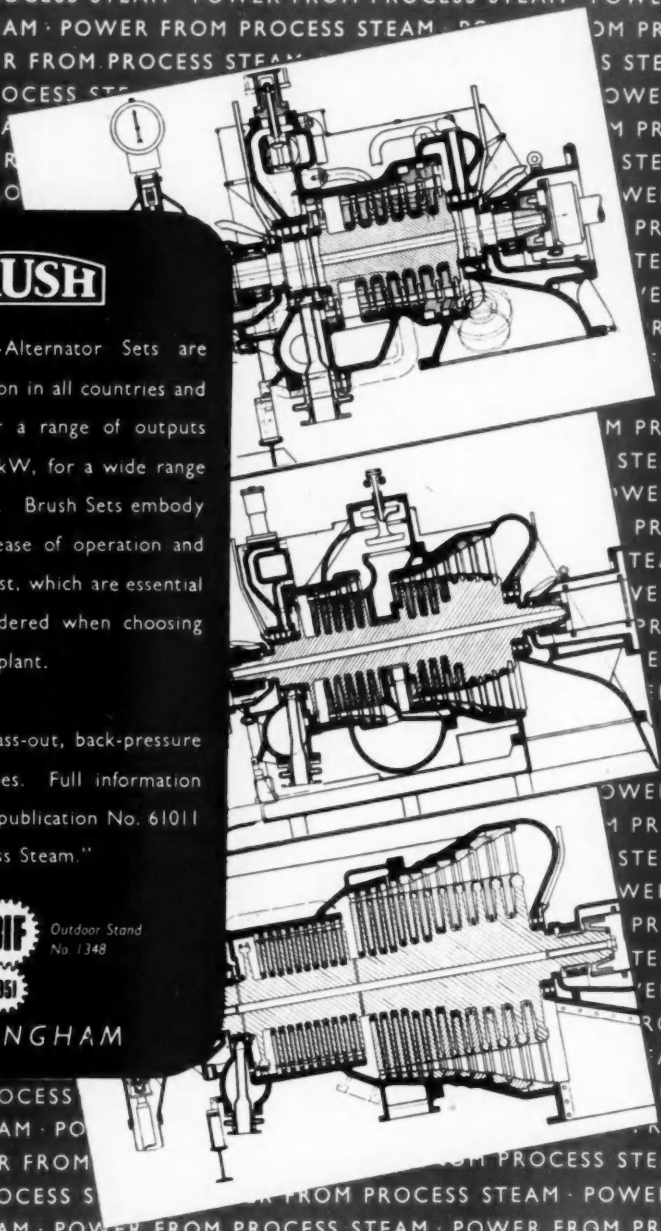
BRUSH

Axial-Flow Turbo-Alternator Sets are suitable for operation in all countries and climates and cover a range of outputs from 500 to 6,000 kW, for a wide range of steam conditions. Brush Sets embody small dimensions, ease of operation and low maintenance cost, which are essential points to be considered when choosing small steam power plant.

The range covers pass-out, back-pressure and condensing types. Full information is contained in our publication No. 61011 "Power from Process Steam."

Indoor Stand No.C-519/418 BIF 1951 Outdoor Stand No. 1348

BIRMINGHAM



POWER FROM PROCESS
OM PROCESS STEAM · PO
SS STEAM · POWER FROM
POWER FROM PROCESS S
OM PROCESS STEAM · POWER FROM PROCESS STEAM · POWER FROM PROC

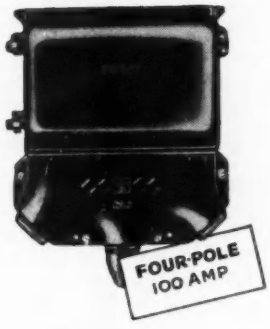
The Brush Electrical Engineering Co. Ltd., Loughborough, England
London, Birmingham, Cardiff, Manchester, Leeds, Newcastle, Glasgow, Bath, Sheffield, Dublin

15·71

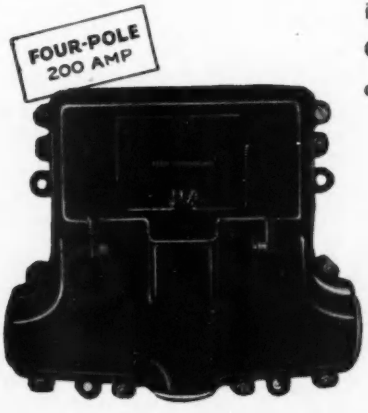
HENLEY

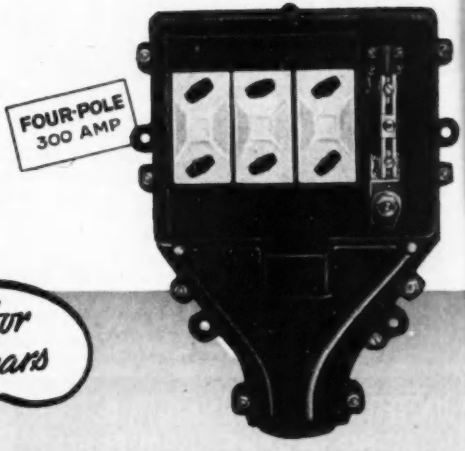
HEAVY DUTY 100-500 AMP

IRONCLAD SERVICE FUSES



HENLEY Heavy Duty Ironclad Service Fuses, suitable for Henley Wedge Type Cartridge Fuse-links, embody all the essential features necessary to ensure simplicity in installation and reliability in service. Only typical boxes are illustrated ; full details available on request.





W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

THE CHEAPEST MEANS OF MAINTAINING A CONSTANT SUPPLY VOLTAGE –

There are 26 standard models of the BERCO "REGAVOLT", most of them giving voltage ranges from zero to 325 volts from a 250 volt, 50 cycle supply, but there are 2 models rated at 3 and 6 K.V.A. respectively, which have been specially designed for voltage stabilising purposes, enabling you to keep your supply constant, even if the mains fluctuate by ±15%.

The outstanding features are

- **Generous design**
- **Robust construction**
- **Rugged self lubricating brushes**

Write for list 605

THE BRITISH ELECTRIC RESISTANCE CO. LTD

QUEENSWAY · PONDERS END · MIDDLESEX

Telephone : HOWard 1492 *Telegrams : Vitrohm, Enfield*

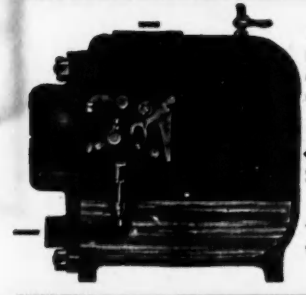
BERCO

REGAVOLT

Regulating Transformer

B.R.3111-CB

"THE BRADFORD" STEAM TRAP



Positive and Instantaneous Opening and Closing.

. . .

Outlet Always Sealed.

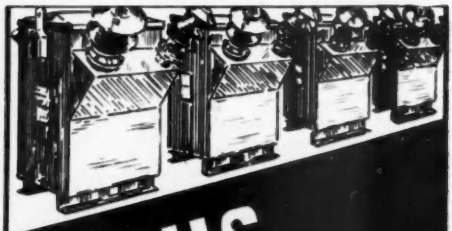
. . .

Thousands Working.

UNITED STATES METALLIC PACKING CO. LTD.

SOHO WORKS · BRADFORD

Branch Offices: LONDON, LIVERPOOL, GLASGOW OLDHAM, NEWCASTLE, CARDIFF, SOUTHAMPTON



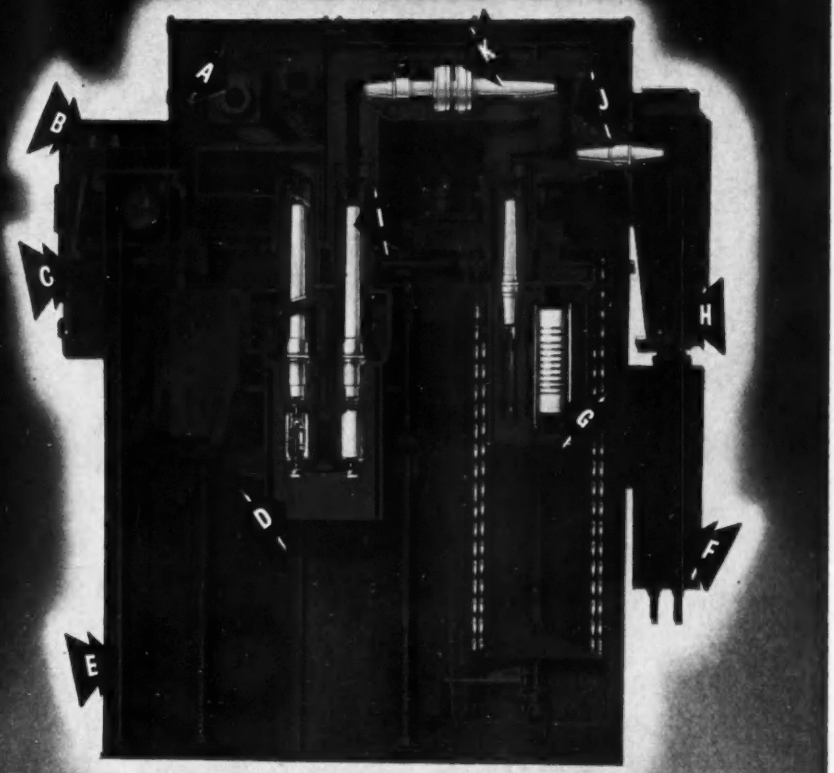
DENIS FERRANTI Company Ltd

Formerly - PEARSON ELECTRIC Co Ltd

..for **DISTRIBUTION TRANSFORMERS**

Royton · Oldham · Lancs: PHONE - MAIN (OLDHAM) 6651

The finer points of SWITCHGEAR DESIGN



HEAVY DUTY METALCLAD SWITCHGEAR

A Condenser bushing busbars
B Continuous trunking for bus wiring
C Door giving access to the ancillary apparatus
D Low oil content circuit breaker
E Roller shutter enclosing front of the unit
F Multi-core cable box conveniently situated behind unit
G Voltage transformer
H Cable boxes suitable for all types of cable
I Isolating contacts in vertical porcelain spout insulators
J Oil-filled connecting chambers facilitate removal of current transformers
K Current transformers mounted on condenser bushings are readily accessible

G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Scarab mouldings
are mechanically strong. They are good
insulators and are highly resistant to tracking.
Scarab moulding powder is inexpensive, easy to mould
and is supplied in black, brown and a wide range of attractive colours.
There is a special plasticised grade with low after-shrinkage
for moulding around heavy inserts.
Write for technical leaflets.

Standard Scarab moulding powder conforms to B.S.1322, Type U.

Distributed by:

THE BEETLE PRODUCTS COMPANY LIMITED

1 ARGYLL STREET, LONDON, W.1

SCARAB is a trade mark registered in Great Britain and in most countries of the world.

B·I·P GROUP

STEADY PROGRESS . . . .

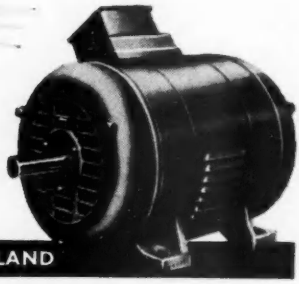
. . . . is being made towards the day when the new plants of The Steel Company of Wales will be turning out wide sheets and coils **—up to 72" wide.** All sheets coming off the Mills whether hot rolled or cold reduced will be rolled in continuous form, combining high finish with accuracy of gauge.

EXPORT SALES ORGANISATION FOR MILD STEEL FLAT ROLLED PRODUCTS
RTSC EXPORTS LIMITED
47, PARK ST., LONDON, W.1.

THE STEEL COMPANY OF WALES LIMITED
ABBEY WORKS · PORT TALBOT

POWER *in harness*

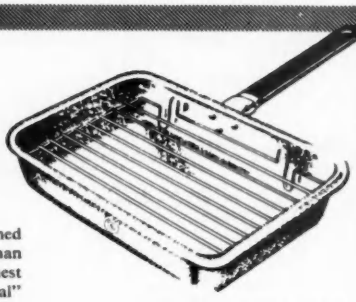
TILLING-STEVENS Motors are the most economical and efficient means of providing *on the spot* driving power for all agricultural and industrial purposes. Reliable, flexible and smooth in operation, they effect savings that quickly pay for their installation. Write for details on motors for single and 3-phase supplies.



TILLING-STEVENS
Electric Motors

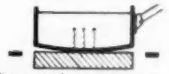
TILLING-STEVENS LIMITED · MAIDSTONE · ENGLAND

THIS IS THE GENUINE THING!

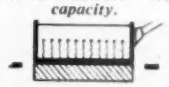


When Pyramid Aluminium utensils, specially designed for electric cooking, were first introduced more than twenty years ago, they filled a need and set the highest standard. To-day there are many so-called "special" electric cooking utensils on the market; but simply to have a flat ground base does not necessarily indicate a properly constructed utensil. Pyramid Aluminium Ware still sets the standard. Pyramid Ware is the genuine thing.

Ordinary uneven pan base causes loss of heat by poor contact.



Pyramid construction gives "all over" contact. Arrows indicate heat capacity.



PYRAMID ALUMINIUM WARE

B.I.F. BIRMINGHAM STAND NO. C. 502

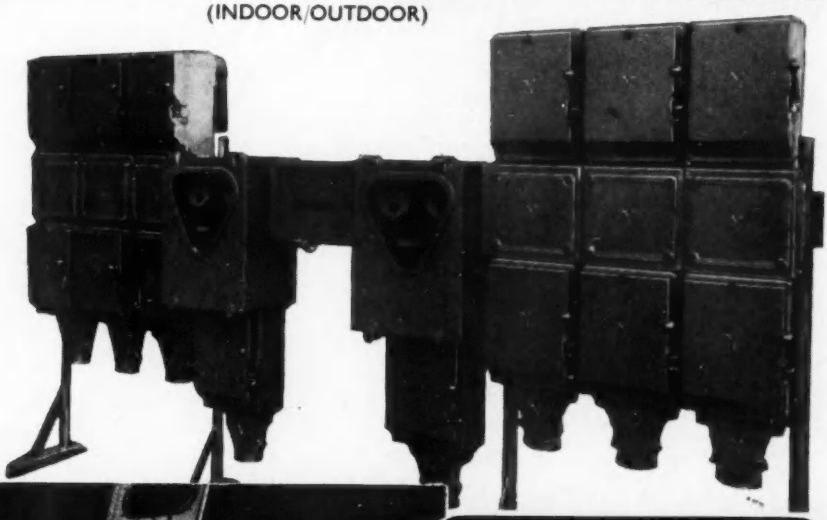
HAGUE & McKENZIE LTD. · PYRAMID WORKS · BIRMINGHAM 1

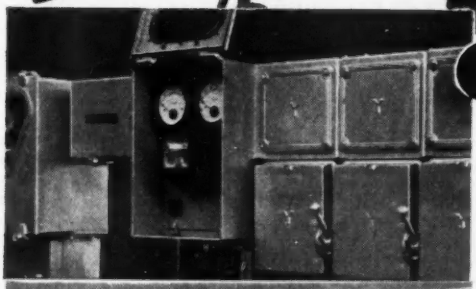
5449E

★ *Inside Information on*

UNIT TYPE "Y" INDUSTRIAL SWITCHGEAR

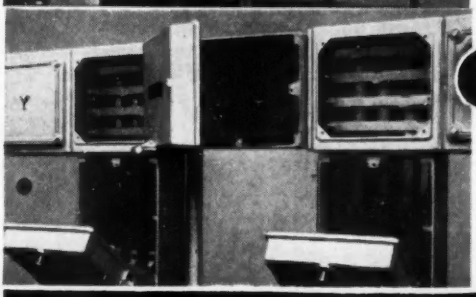
(INDOOR/OUTDOOR)





METERING and INSTRUMENTS

Typical "Y" type Fuse Switchboard (for indoor or outdoor use) with Metering on two incoming circuits, including Bus Section Switch.



BUS SECTION SWITCHES

Bus Section Switches (of Standard unit type) for splitting bus bars into sections.

Visit Stand No. C.327 B.I.F., B'ham.

ELECTRO MECHANICAL MANFG. CO., LTD.

Tel. Scarborough 2715/6 SCARBOROUGH, YORKS Grams: EMMCO SCARBOROUGH

London Office and Showroom: Grand Buildings, Trafalgar Sq., W.C.2. Phone: Whitehall 3530. Grams: Tramsuplin Rand

Associated with Yorkshire Switchgear and Engineering Company Limited, Leeds, 6

X-RAY

on the

Creda BOILING PLATE

X-ray inspection during the manufacture of "Creda" Boiling Plates ensures centralised spacing of the resistor in the grooves. Of robust construction these Boiling Plates are thoroughly dependable in operation and will give trouble-free service under the most exacting conditions

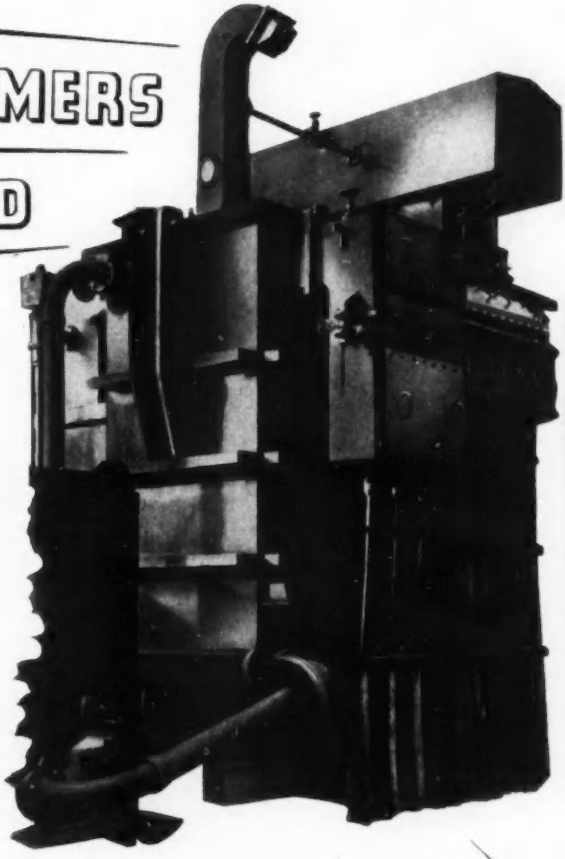
QUICK DELIVERY

SEND YOUR ENQUIRIES TO THE HOUSE OF Simplex

Simplex Electric Company Limited
Oldbury Birmingham and Branches

A TI COMPANY

TRANSFORMERS OF PROVED MERIT



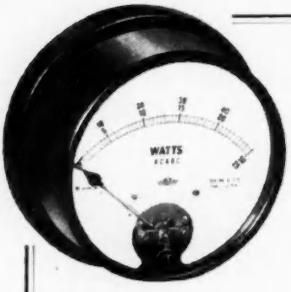
WE SPECIALISE in manufacturing Power Tran formers for Generation, Transmission and Distribution

ALL YORKSHIRE Transformers are entirely manufactured in our own works. We make Transformers to suit all requirements up to 45,000 k.V.A.-132,000 volts

YORKSHIRE YET TRANSFORMERS

YORKSHIRE ELECTRIC TRANSFORMER Co. LTD

THORNHILL · DEWSBURY · YORKSHIRE · *Phone:* DEWSBURY 1691/2



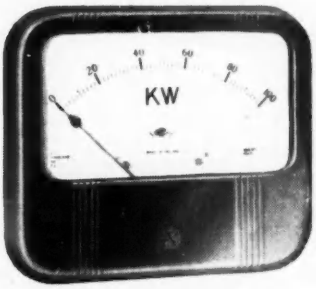
Early delivery

PULLIN

INDUSTRIAL SWITCHBOARD INSTRUMENTS

We are pleased to announce improved deliveries of all types of these famous switchboard instruments. The Round projecting type with either 4 in. or 6 in. dials and the Rectangular Pattern with 6-in. dial.

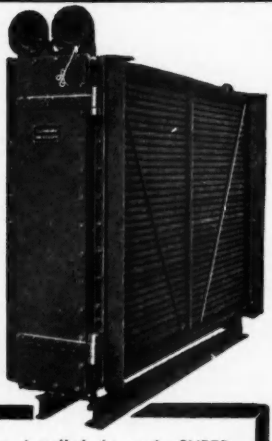
Supplied in moving iron, moving coil or dynamometer pattern. The consistent accuracy of all Pullin Measuring Instruments is assured by their extremely robust construction.



MIP

Measuring Instruments (Pullin) Ltd., Electrin Works, Winchester Street, W.3. Telephone: ACOrn 4651

CLOSED CIRCUIT AIR COOLERS



have already been installed in such SUPER POWER STATIONS as Hams Hall, Nechells, Deptford, Poplar, Johannesburg, Adelaide, as well as numerous large and small power stations. They are of tubular construction with no normal connection with the outside atmosphere.

THE
PREMIER COOLER & ENGINEERING CO., LTD.
Shalford Nr. Guildford Surrey.

See our Exhibit at the British Industries Fair, Stand Number D607, Castle Bromwich, Birmingham

JOHN RIGBY & SONS, LTD

S.P. Transformer Bushings

A recent addition to the range – **TYPE A-4,** working voltage 600-1,000 volts current ratings 150, 350 and 500 amps.

The S.P. range includes bushings for all voltages up to 88kV and current ratings up to 1500 amps. Write for Catalogue No. 21.

STEATITE & PORCELAIN PRODUCTS LIMITED

Stourport on Severn, Worcestershire. Phone : Stourport 111. Grams : Steatain, Stourport.

SP. 46

MINERVA
ELECTRICAL
INSULATING VARNISHES

Kirkstall Power Station, Leeds, of the B.E.A., showing in the foreground the fourth B.T.H. 30,000-kW turbo-alternator in the station. In the background are two B.T.H. 25,000-kW turbo-alternators

Photograph by courtesy of

THE BRITISH THOMSON-HOUSTON CO. LTD. RUGBY

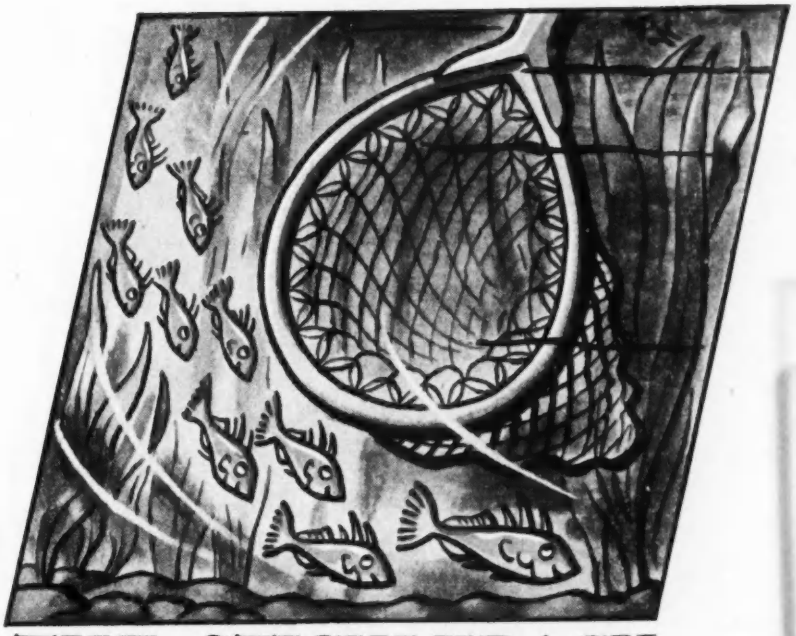
The consistent excellence of MINERVA ELECTRICAL INSULATING MATERIALS ensures their regular use by all the great producers and users of electrical machinery in the Kingdom.

Our Technical Department will advise on all matters relating to the use of MINERVA INSULATING VARNISHES AND COMPOUNDS. Send your problems to the Insulating Varnish Department.

PINCHIN JOHNSON
Home Sales Division

4 CARLTON GARDENS, LONDON, S.W.1.

Telephone: TRAfalgar 5600. Telegrams: Pinchin, Phone, London.



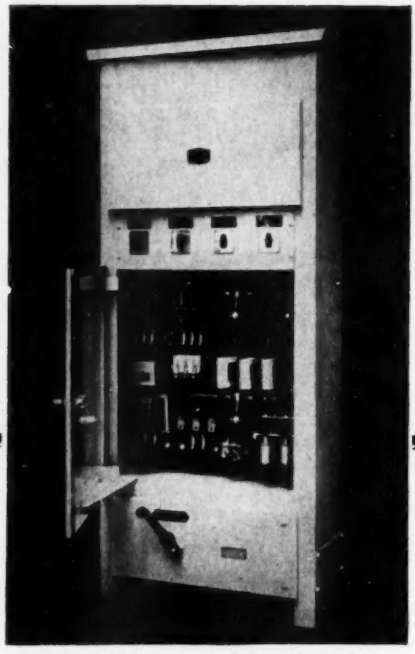
THE STICKLEBACK

By knobs upon its vertebrae
The stickleback is known to me.
Had it a normal streamline spine,
That precious fact would not be mine.

FBC
ALL-BRITISH
ball and roller bearings

WE MAKE SMOOTH
'TIDDLERS'. HERE'S ONE

FISCHER BEARINGS CO. LTD., WOLVERHAMPTON. Subsidiary of British Timken Ltd.



Pillar Type] Multi - Motor Starter Panel

ILLUSTRATED IS A MULTI-MOTOR STARTER PANEL FOR STARTING THREE SQUIRREL CAGE AND ONE SLIPRING INDUCTION MOTORS.

THE DIRECT-ON LINE STARTERS ARE RATED AT 30 AMPERES, AND THE AUTOMATIC STATOR ROTOR STARTER AT 75 AMPERES.

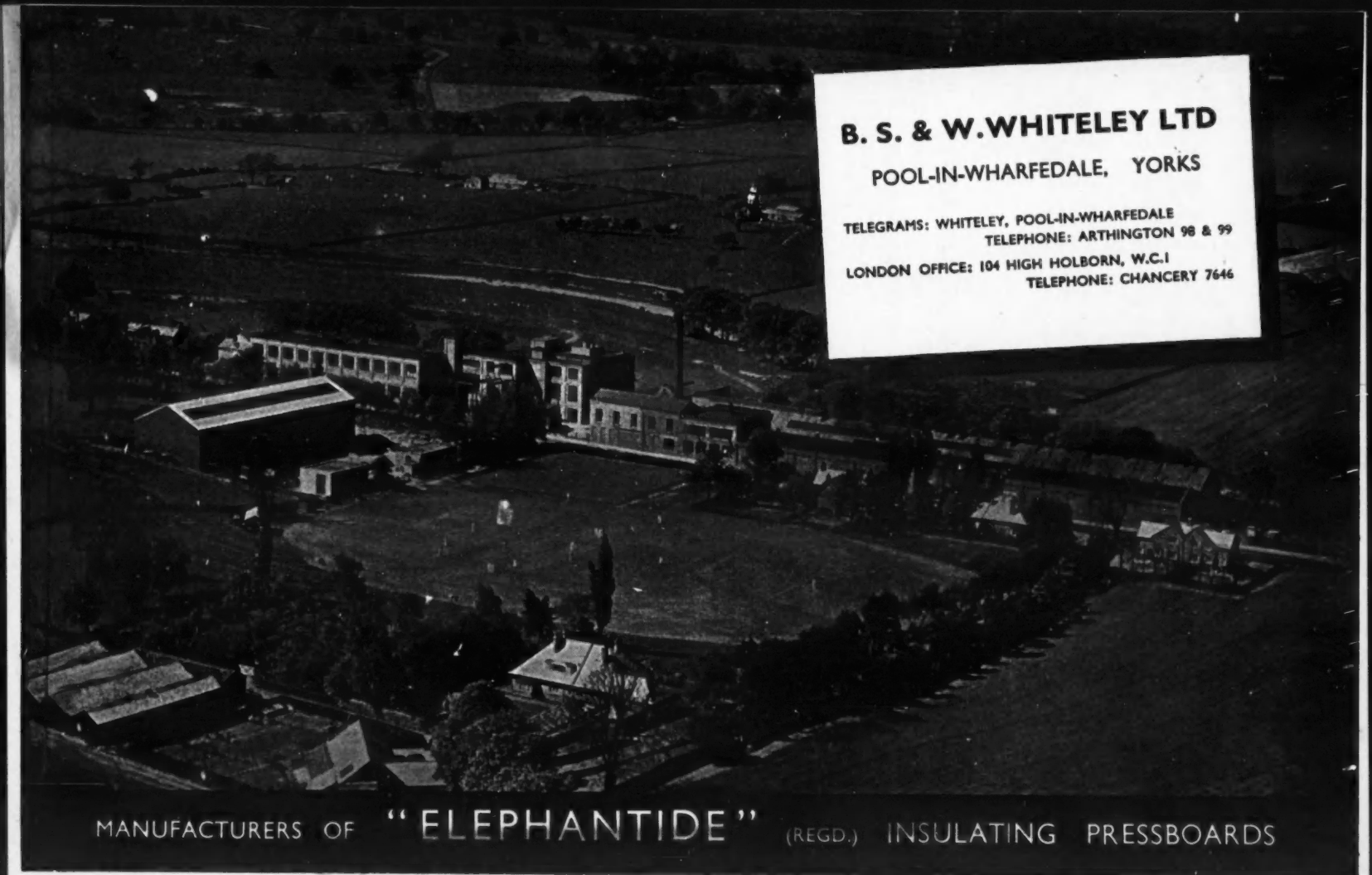
THE STARTERS ARE ARRANGED FOR AUTOMATIC SEQUENCE STARTING WITH EXTERNALLY OPERATED ROTARY SWITCHES TO ENABLE ANY OF THE MOTORS TO BE RUN INDEPENDENTLY.

THE GROUP ISOLATING SWITCH IS MECHANICALLY INTERLOCKED WITH THE DOOR OF THE MAIN COMPARTMENT.

the **Belmos** BELMOS *company limited*

BELLSHILL · LANARKSHIRE

LONDON OFFICE: COLUMBIA HOUSE, ALDWYCH, LONDON, W.C.2.


B. S. & W. WHITELEY LTD
POOL-IN-WHARFEDALE, YORKS
TELEGRAMS: WHITELEY, POOL-IN-WHARFEDALE
TELEPHONE: ARTHINGTON 98 & 99
LONDON OFFICE: 104 HIGH HOLBORN, W.C.1
TELEPHONE: CHANCERY 7646
MANUFACTURERS OF "ELEPHANTIDE" (REGD.) INSULATING PRESSBOARDS

DEPENDABLE DELIVERY

EVERY DESCRIPTION
OF
ELECTRICAL MATERIAL
FOR
EVERY SITUATION

E.W.F. ELECTRICAL WHOLESALERS FEDERATION MEMBER

WE HANDLE HIGH-CLASS MATERIAL ONLY

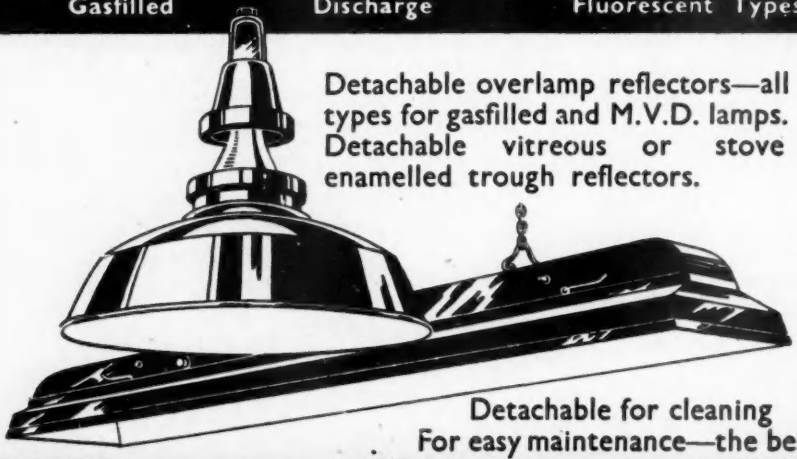
OUR ADDRESSES:

LIVERPOOL	MANCHESTER	CARLISLE	BIRKENHEAD	WORKINGTON
1-9 Stanley St.	30 Pall Mall	Paternoster Row	94 Chester St.	Oxford Buildings, Oxford Street

DOWNES & DAVIES LTD

THORLUX INDUSTRIAL LIGHTING EQUIPMENT. Manufacturers of

Gasfilled Discharge Fluorescent Types



Detachable overlamp reflectors—all types for gasfilled and M.V.D. lamps. Detachable vitreous or stove enamelled trough reflectors.

Detachable for cleaning
For easy maintenance—the best.

F. W. THORPE LTD. WELBY RD HALL GREEN BIRMINGHAM 28

SPRINGFIELD 3318 GRAMS: THORLUX B'HAM

NALDERS

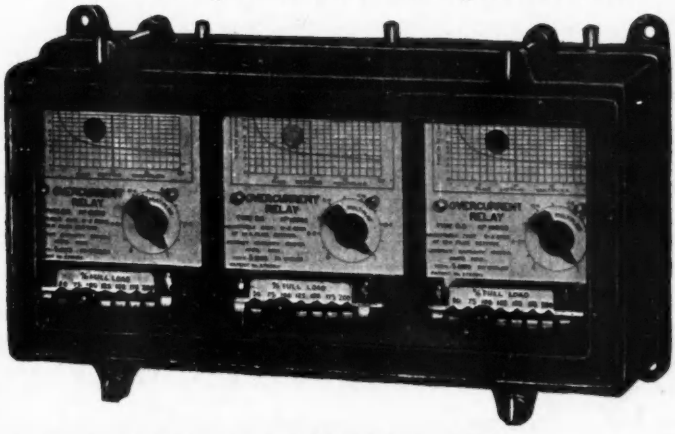
PROTECTIVE RELAYS

TO B·S 142/1942

HIGH QUALITY

ALWAYS UP TO DATE

Ensure unfailing performance. Generators, Transformers, Transmission Line Busbars, Feeders, Meters, etc., are fully protected by Nalder "L" type relays as used in leading Power Stations throughout the world.



NALDERS RELAYS have high torque, low energy consumption, and a wide range of adjustable settings. They are vibration and surge proof, fitted with reliable contacts and operation indicators, and occupy small panel space.

FIVE TYPES are available in Nalders "L" Series, single, double, and treble pole patterns, for horizontal or vertical mounting.

Conforming in all respects to the latest requirements of B.S.142/1942.

Quotations on request.

NALDER BROS. & THOMPSON LTD.
Telephone: Clissold 2365 (3 lines). Telegrams: Occlude, Hack, London

DALSTON LANE WORKS
LONDON, E.8

FRYOLUX SOLDER PAINT *simplifies* SOLDERING

This model illustrates the ease with which complicated multiple assemblies are soldered using Fryolux solder paint.

The model is jointed, both lap and butt, entirely by Fryolux solder paint and consists of 160 separate pieces of brass and copper making a total of 260 soldered joints.

Technical Publication No. 22 describes the various types of Fryolux solder paint supplied and their application showing a great saving in both time and material costs.

Write for copy to

FRY'S METAL FOUNDRIES LIMITED

TANDEM WORKS · MERTON ABBEY · SW19. MITCHAM 4023

and at MANCHESTER, GLASGOW, BRISTOL, BIRMINGHAM AND DUBLIN

ELECTRICAL TIMES

Vol. 119 No. 3100 THURSDAY, 5 APRIL, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

ADDING UP THE LOAD, *by A. H. Gray, M.Sc., A.M.I.E.E., and N. Ryder, Assoc. M.C.T., A.M.I.E.E.* 551
OUR READERS' VIEWS 554
POWER FROM SNOWY MOUNTAINS 556
ELECTROLYSIS REMOVES RUST 558
THE TOOLS OF PHYSICAL RESEARCH 559
NOTES ON WIRING, *by Megohm* 567
THE D.S.I.R. ANNUAL REPORT, 1949-50 568
PROBLEMS AND PRACTICE IN ENGINEERING 569
MASS-PRODUCTION CONTRACTING 571
OVERSEAS NEWS 572
PERSONALITIES IN THE INDUSTRY 574
BRITISH STANDARDS 576
NEW HIGH-SPEED COUNTING TUBES 577
NEW LITERATURE 577
THE BUYER'S COLUMN 578
NOISE CONTROLS COAL FEED 580
THE WEEK IN NEWS 581
Electric Supply News 586
Company Activities 587
COMMERCIAL INFORMATION 588
CLASSIFIED ADVERTISEMENTS *61*
INDEX TO ADVERTISERS *68*

SUBSCRIPTION RATES.—United Kingdom and Overseas £1 17s. 6d. per annum. Canada C$5·50, U.S.A. $5·50 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 6d. each.

OFFICES — SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telephone - HOLborn 6016 Telegrams - Equivolt, Estrand, London

After years of intensive research, Hoover Limited offer an entirely new range of F.H.P. Motors to challenge existing standards of " fractional " performance, construction and design.

Only the latest developments which actual experience of modern "fractional" applications has proved to be most practical have been included.

The result has been a unanimous acceptance of the new motor by all sections of industry. Evidence of this is provided by an immense demand from manufacturers who require the new motor for inclusion in a wide variety of products.

Hoover Limited also offer a 5-point Service Plan. It provides full facilities for both service and advice at a factory or workshop anywhere in the country.

HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT

CAMBUSLANG · LANARKSHIRE · SCOTLAND

Editorial

THIRD BIRTHDAY

THE closing of the B.E.A.'s third year marks off a period of consolidation, rather than of distinctive development. This statement is not intended to dim such achievements as the record installation of new plant nor the adoption of the principle of the 275 kV grid reinforcement. It is to suggest, rather, that despite minor outbursts of certain undercurrents, there has been a general settling down under the influence of time; indeed, it is perhaps possible to detect signs of self-complacency creeping in. The year has been a good one for electricity supply. The long term of unpleasant weather, combined with a shortage of household coal, has lifted consumption by over 12%, so that some of the gloomy prognoses on area board profits may not be so bad after all. What a different prospect is offered by the coming year! The additional increase in bulk charges has precipitated an all-round raising of prices to consumers. The ½d.-a-unit line has been abandoned; the question now is, how long can ¾d. a unit be held? Costs are rising faster than ever and another crop of freight increases is imminent. With a financial position which allows of little elasticity only by the closest enforcement of the rescript on economy can further increases be avoided and even such measures may prove inadequate.

CHOOSING THE MEN

THE latest study of the Acton Society Trust is concerned with the men on nationalised boards. It is more statistical than former publications, and records the classification of board members, both full and part time, their education and their age. This shows clearly that in making the appointments a middle path has been steered between "Jobs for the boys" and "same old gang," though it is unlikely that these familiar cries will lessen in consequence. Perhaps the most telling criticism offered is that boards have failed to realise the full magnitude of their task, and the instance is given of Lord Hyndley, who was formerly responsible for the forty pits of the largest colliery group, and now controls 980 pits. Such an organisation presents a new set of problems, which have not always received an imaginative approach. The responsibility of the Minister for board appointments is likewise criticised, and the suggestion is made of a small permanent appointing commission. This must, however, be read with the plea for a wider representation on the boards drawn from other professions and sections of the community. But such a board can be responsible for some strange policy making. Perhaps the mistakes in the past have been due, not to the system, but to inadequate guidance of the Minister in the initial stages when no properly constituted board was available for consultation. It would seem that the industry concerned should be the best judge of the men that can be useful to it (with a final independent arbiter in the person of the Minister) rather than a special commission covering all industries.

DESIGN IN ENGINEERING

DESIGN, in so far as it affects external appearance, has almost a different meaning when applied to consumer goods in comparison with capital goods. The former have to be "streamlined" or "functionally designed" or whatever may be the latest catchword for attracting the public's eye. Under the cloak of some such phrase, which starts as a sound idea, equipment may end in exaggerated monstrosities which subsequent generations will regard with that gentle ridicule that we accord to Victorian ornamentation. It is clear that this cult of the modernistic is affecting also the design of capital goods, but fortunately under the restraining influence of the engineering eye.

The general lines of machinery are becoming cleaner, dangerous and ugly excrescences are removed and sombre colours of the older machines are a thing of the past. The trend will continue and increase while psychologists and welfare officers are forever seeking the factory beautiful, an ideal at which few will cavil. But let it be faced that most designs of this type are more costly in the use of metal than those produced to purely engineering requirements, and since there is no visible end to the materials shortage, undue exuberance for filling in the hollows must be kept under control. No-one would wish to see the introduction of austerity designs, but let the outer lines of machinery truly reflect the internal mechanism, and any suggestion of externals or additional covers which do no more than embellish be avoided like the plague.

MEASUREMENT IN FARMING

ELECTRICITY already plays an important part in farming and with the growing stress on a scientific approach to agriculture, it seems likely that methods of electrical measurement will find an extension into this field. An obvious application lies in the measurement of *p*H values of soils and use has also been made of electrical means to ascertain the degree of moisture present. This can be done by burying in the field small plaster of paris blocks containing two electrodes, the resistance across which is measured by a bridge circuit. Such a technique is particularly applicable to irrigated land, where it provides an accurate indication of the minimum amount of water required by the crops.

MASS-PRODUCED WIRING

THE digest, on another page, of a description of American large-scale house wiring methods, while interesting to British contractors, will hardly tell them much that they did not already know. Faced with the sole contract for wiring 1,600 houses at a time we feel that British contractors could find a few new ideas, too. The additional complications of an underground service—as opposed to the almost childish simplicity of an outdoor cabinet with a length of conduit for the leading-in wires—and the conditions imposed by I.E.E. regulations or local specifications would, no doubt, prevent a near approach to the American figure of 18 man-hours per house, even for three-bedroom bungalows. To "Meteor", however, the most singular feature is the fact that the Americans turned down the use of "harness" wiring, with cables cut and jointed in a jig under workshop conditions. It would seem that a contract of this magnitude (ultimately 17,000 houses) would be one of the few instances which presented production problems similar to those encountered with planes and pre-fabs, in which harness wiring was so successfully used.

FITTING THE CRIME

THE development of civilisation appears to be marked by a geometric growth in the list of criminal offences and every phase in evolution is marked by its own measure of misdemeanours arising from those restrictions which it would seem are the hallmark of progress. Even the present power shortage has led to its own crop of crimes extending even to that heinous act of using a dry battery to light a shop window. Such criminal tendencies are to be found elsewhere in this sorry world and "Meteor" learns with apprehension that at St. Kilda in South Australia a consumer, lacking both gas and coal, was rash enough to use his baby electric cooker during prohibited hours. In passing sentence, the magistrate, wisely following the precept of that great authority on jurisprudence from the Savoy, has sought to fit the punishment to the crime. Not only is the miscreant to be fined, but he is to have his electricity cut off for 48 hours. Here is punishment indeed! Who knows but what this simple deprivation of a modern comfort may develop into a new weapon in the armoury of the judicature. We only hope a directive will be issued on who is to pay the re-connection charge.

Meteor

Adding up the Load

The Summation and Remote Indication of Total Generator Output

By A. H. GRAY, M.Sc., A.M.I.E.E. and
N. RYDER, Assoc.M.C.T., A.M.I.E.E.

ONE of the most necessary measurements for successful control of a station is that of the total generator load. As a rule this information is desired at several places: the control room, the boiler house, and possibly the station engineer's office.

The summation equipment used to obtain this information should be accurate, reliable, independent of the distance between the point of measurement and place of display, flexible (without sacrifice of accuracy), and quickly and continuously responsive to changes of load. The accuracy required over the range of usual conditions is not, of course, that demanded for tariff metering. Reliability is most important in such apparatus; what little maintenance is necessary should be easy to carry out. Apparatus independent of the distance between the point of measurement and the place of display allows a degree of standardisation of design and anticipates any alteration to the station layout after its installation. The busbar system may change also, and the number of generators running will vary with varying load; these possibilities both point to the necessity for flexibility in the summation equipment. The equipment does not need to be responsive to transient conditions (other apparatus is available for this), but it is desirable that it should display information soon after a change has occurred.

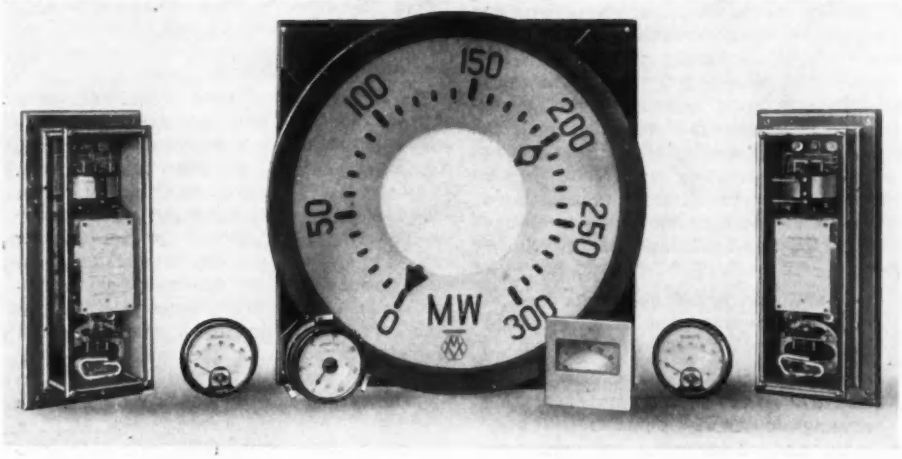
Such are the requirements of the equipment. The methods of applying it are threefold:—(*a*) current summation: (*b*) direct summation of watts: and (*c*) torque conversion.

Current Summation

As the term implies current summation is the summing-up vectorially of the various machine load-currents through a suitable summation transformer or the like; the resultant is correlated with a common voltage on a normal wattmeter. So long as this common voltage is truly applicable to all machines, the system is very simple and reliable and has an accuracy sufficient for this particular application.

When, however, the station incorporates sectionalised busbars interconnected through reactances, complications arise. When voltage drops occur compensation must be made to

Fig. 1. Instruments and apparatus which are used in the system showing (left and right) transmitters, (centre) a large scale indicator and at bottom various auxiliary indicators



ensure that the common voltage applied to the summation meter is an accurate vectorial image of the output voltage. This compensation may become so complicated that the fundamental advantages of this particular method are lost.

Direct Summation

The summation of watts directly requires a multi-element wattmeter, one element of which is connected to each generator. Such a scheme has all the advantages of the first method, and furthermore, eliminates the common voltage. Thus the summation is accurate for all system conditions and is independent of the difficulties due to split busbars or the equivalent. It will be realised that this type of scheme is rather more costly than the current summation method, since more pilot wires are involved, but in spite of this, the method is simple and finds favour on many sites.

Torque Conversion

Torque conversion methods are the most widely applied, and although rather more complicated than the schemes already mentioned they are much more flexible.

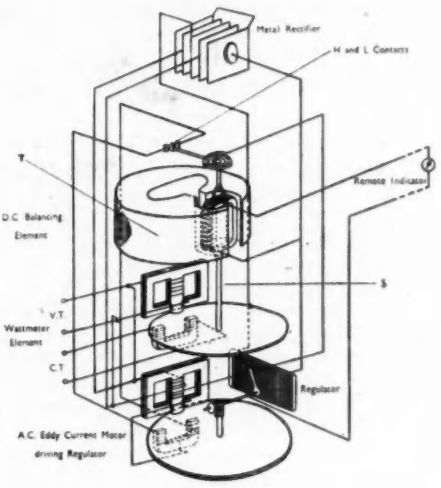
One method employs a transmitter which consists of a number of wattmeter elements energising a common rotor system. This in turn is connected through a suitable spring to the rotor of a moving coil relay. This relay is fitted with a single-pole double-throw switch, which energises a small induction motor coupled to a small potentiometer rheostat.

If the torques of the two systems are equal, the contacts will remain open; but if a difference of torque occurs, the contacts close on the one side or the other and energise the induction motor. This motor drives the rheostat in the appropriate direction and changes the direct current through the moving coil relay, until the torques of this relay and the sum of the wattmeter elements again balance. In series with the moving coil relay are one or more receiving instruments which measure this direct current and hence give a reading proportional to the sum of the wattmeter elements. Fig. 2 shows a typical example of a summator-transmitter.

The outstanding advantages of this scheme are:—

(1) The transmitter is universal in its application, since the wattmeter element may be replaced by any other type of indicator (e.g., ammeters, voltmeters).

(2) The conversion to direct current enables the receiving or display elements to be of simple standard design (i.e., milliammeters)



and uses only two pilots between the transmitter and receiving elements.

(3) The accuracy of the equipment is independent of any voltage change.

(4) The use of direct current provides a ready means of summing individual transmitters, and forward and reverse power flows can be easily indicated.

Display Indicators

As already mentioned, the receiver which indicates the total load is a d.c. milliammeter and thus can be made in any size or shape to meet the particular requirements. Apart from these standard instruments, it is usual to build one or more special instruments of large size, which are mounted in special vantage points where they can be seen over considerable distances by the operating staff.

Details of Indicator

A typical example of such a large indicator is shown centre, Fig. 1. The case is of light fabricated steel construction and is fitted with four side lugs for suspension from either ceiling or wall. In this particular case the instrument is fitted with two dials so that indication can readily be observed from a considerable distance on either side. The scales, which are 54 inches long and cover an arc of 300°, are marked in bold characters on an opal translucent material arranged with rear illumination by a common set of lamps mounted inside the instrument, care being taken to see that the heat dissipated in no way affects the accuracy of the instrument. The windows are mounted in steel frames, which in turn are fixed to the main case, and in order to

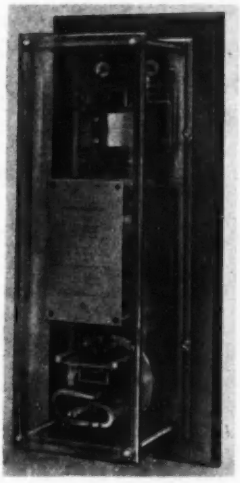


Fig. 2.
The method of operation is seen in the isometric drawing on ← *the left* (p. 552)

Fig. 3. →
The M.V. remote indicating transmitting instrument type DP is neatly housed in a plate glass cabinet

eliminate danger to human life the windows themselves are made of heavy armour plate glass. Because these instruments are generally fitted in inaccessible places, every facility is provided to ensure that the maintenance of the instrument, changing of the lamps, cleaning of the windows, and so on is easily accomplished.

In this indicator the necessary attention has been paid to reliability. A heavy magnet system has been designed with a high flux density so that a torque of approximately 1,000 times that of a normal switchboard instrument is available from the comparatively few milliamperes delivered by the transmitter. This high torque permanent-magnet moving-coil system incorporates gearing for driving both pointers, one of which has of necessity to rotate in the opposite direction to the other to ensure that the zero point is on the left hand side of both dials. All bearings are fitted with ring jewels and end stones to minimise friction both during the initial tests and the subsequent life on site. In spite of the high torque of the instrument it is interesting to note that it is completely dead beat in action; the pointers follow the changes in transmitter immediately, without any noticeable oscillation, Temperature compensation has also been arranged, and the error reduced to negligible quantities.

Dirt Protection

In practice many of these indicators are mounted in boiler houses or similarly unclean atmospheres. To prevent the entrance of dust or dirt from the lamp compartments (which are necessarily ventilated), the complete movement is enclosed in a cylindrical housing inside the main case, and the dial plates are fitted to this interior housing with gaskets.

The centre portion of the window has been made opaque so that the scale appears in the form of a brightly illuminated annulus. This form of display has been found in practice to be more legible at a distance than the more conventional form of scale.

Another valuable feature of this instrument, used for impending load indication, is the addition of a further pointer which may be termed the target pointer. The target pointer is remotely controlled from the control room and gives an indication of any impending load changes. By this means the boiler staff is kept informed of all requirements without contacting the control room.

A Selsyn receiver is mounted inside the movement housing and geared to drive the target pointer on each dial; this pointer is mounted concentrically with the actual load pointers. To avoid confusion with the target pointers, the load pointers are made obviously different in shape (as can be seen in Fig. 1).

Ancillary Gear

The transmitter associated with these target pointers is a 6-in. switchboard instrument which can be readily incorporated in the control desk; it houses a Selsyn transmitter with an operating knob and a scale that is a replica of the total load indicating scale itself. When a change of load is required it is a simple operation for the control engineer to draw the attention of the boiler staff by means of the normal signalling system, alter the target pointer to the new load conditions and await a signal back from the boilerhouse stating that the requirements are fully understood. These ancillary signalling devices can be the audible or visible means already existing. As the necessary changes are being made the results will be clearly visible both to the boilerhouse staff and the control room, and the approach of the actual load pointer to the target pointer will indicate to all that the operation is being successfully achieved.

It is sometimes desirable to repeat these indications in places other than the boilerhouse and control room, and it becomes an easy matter to drive the impending load pointers from a common transmitter housed in the control room.

One final advantage of this system is the ease with which additional receivers, either large or small, can be added without serious change to the equipment as a whole.

Our thanks are due to Metropolitan-Vickers for permission to publish the above article.

Our readers' views . . .

Service Centres

IN your issue of March 22, Col. Waley Cohen rightly states that "extravagance in service centres has to be paid for out of the pockets of the consumers," and then he suggests that many of the service centres in London could with advantage be closed.

Far from thinking of closing service centres in London, my Board would like to open at least six more, and they do not regard reasonable expenditure on these centres as being a form of extravagance. Some of the centres pay for themselves out of the profits on the sale of electrical apparatus; but to make a cash profit is not the primary purpose. In the public service which they have to perform, Area Boards, through their service centres, give advice and help to consumers, provide them with demonstrations of various kinds, enable them to settle or ask questions relating to their accounts, and generally maintain a friendly contact with them.

At the present time, when capital expenditure is being curtailed, it is not possible for my Board to develop as they would like to do; but when times become more normal it is hoped that there will be an expansion of the facilities which are available to consumers through service centres.

Frank C. Fenton
(Chief Commercial Officer)
LONDON ELECTRICITY BOARD

◆ ◆ ◆

Voltage Reduction

I WAS very interested in the article on the subject of voltage reduction which appeared in a recent issue of the ELECTRICAL TIMES.

Whilst speed drops due to the combination of low frequency and voltage have been noticed by piece-workers and trouble has been caused on the more complicated lifts, the most maddening thing is the effect on controlled time systems.

In these systems the main control is by a high grade pendulum clock which passes on impulses to the card and wall clocks via a master and secondary relays operated by rectified current. The effect of reduced voltage is to cause the relays either to flutter violently, thus causing the clocks to go at a tremendous rate, or alternatively to lose impulses so that many varieties of time exist throughout the works. Audible signals have also been affected resulting in a general exodus minutes before time.

The most serious aspect of this kind of irregularity is its effect on the time cards, and it was found very difficult to adjust the clocks to the correct time in readiness for the afternoon session.

It is hoped that the installation of a constant voltage transformer will make the system independent of voltage variation.

F. C. Platt
BIRMINGHAM M.I.E.E.

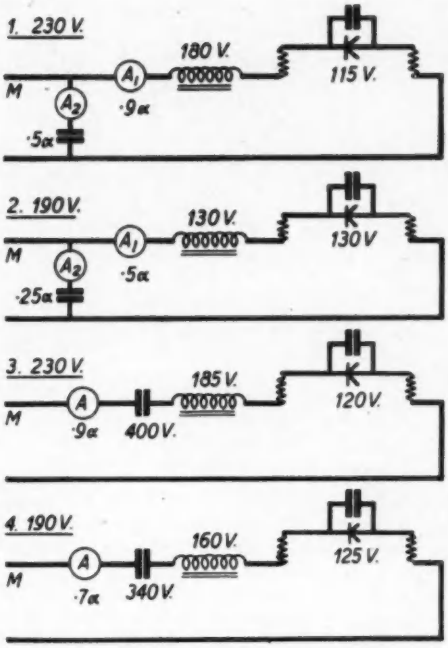
◆ ◆ ◆

Trouble with Fluorescents

REFERRING to the trouble experienced by "G. R. T." with fluorescent lamps in your issue of March 22, as the series arrangement of capacitor and choke is normal in the B section of the twin tube arrangement at 220/230 V, there does not seem to be any reason why capacitor discharge should cause the breakdown of switches mentioned. The diagrams 1 to 4 show the values of current and voltages with both connections of capacitor at 230 and 190 V.

Flickering of the lamp at low voltages is usually due to the starter switch, especially if of the glow type, responding to the higher voltage across the tube ends. I do not consider a 5 amp QM/QB switch adequate to control more than two fluorescent lamps, and prefer to use 10/15 amp D.P. switches in all other cases. I have had eight lamps controlled by one such switch in many cases and have not had any switch trouble or flashover, though the T.T. system is used throughout both on 230 V and 250 V circuits with over a thousand fittings in each installation.

The few 5 amp switches in use have not given any trouble as regards faults to earth, but the contacts do not stand up for long where frequent switching is necessary. The plain choke circuit is of course highly inductive and hence rather severe on the ordinary 5 amp switch. It will be noticed that with the series circuit (No.



Diagrams showing current at various voltages
Capacitance 7 mfd. = j455 ohm.
Choke Z 16 + j 260 ohms at 0·5 amp
16 + j 230 ,, ,, 0·7 ,,
16 + j 200 ,, ,, 0·9 ,,

3) the current to be broken is highest of all those shown, and with five lamps per switch, 4·5 amps may be more than the switch can cope with, and an arc formed at breaking circuit may be followed by flash-over to earth from the mains.

A.G.N.

BROUGHTY FERRY

◆ ◆ ◆

Engineers Wanted

MAY I refer to the letter from your correspondent "Area Board Employee" in your issue of March 15.

I strongly disagree with the plea for legislation to restrict the employment of "unqualified" engineers. It is just about time that people like this correspondent took a peep outside their little world of qualified technocrats at the vast and growing engineering world around them.

For many years now, the demand for competent engineers has greatly exceeded the supply and industry must make do with what is available. It is also noteworthy that not all qualified engineers are the most competent in their particular jobs and if industry, whether private or nationalised, is to succeed it must pay salaries and wages for the job and not in recognition of some technical or other qualification gained by the individual in the distant past. It must, however, pay adequately for positions of responsibility and in this I agree with your correspondent.

W. H. Campbell
A.M.I.E.E.

BRISTOL

◆ ◆ ◆

Addition of Vectors

THE interesting article by Mr. J. L. Egginton (March 15) describes a method of adding vectors which are in the polar form. Tables are given which enable $a/\underline{\alpha}$ and $b/\underline{\beta}$ to be added without first converting to the rectangular form i.e., $a.\cos\alpha + j.a\sin\alpha$.

A short table for vector addition will be found in *Tables of Functions* by Jahnke and Emde (Dover Publications, New York), but it is inconvenient as the angles are given in fractions of a right angle.

Recently, a full table for the solution of this problem has been published, which is arranged in a convenient form, with full facilities for interpolation. This is *Table for Use in the Addition of Complex Numbers* by Rybner and Sørensen (Jul. Gjellerups Forlag, Copenhagen).

Using this table the addition of $27/\underline{16}°$ and $43/\underline{64}°$ becomes: $43/\underline{64}° + 27/\underline{16}° = 43/\underline{64}° (1 + \frac{27}{43}/\underline{-48}°) = 43/\underline{64}° (1 + 0.63/\underline{-48}°)$.

Entering the table with 0.63 and 48° we find tabulated 1.49666 and 18.229°, which are the polar coördinates of $(1 + 0.63/\underline{48}°)$.

Therefore, the vector sum $= 43/\underline{64}° \times 1.497/\underline{-18.2}° = 64.4/\underline{45.8}°$.

This table enables vector addition or subtraction to be made with ease; and the angles are not restricted to acute angles. A serious disadvantage of these methods of addition is that they apply to the addition of only two vectors: more than two vectors must be treated in pairs with a considerable increase in the labour of computation.

Both tables can be obtained from the Scientific Computing Service Ltd., 23 Bedford Square, London, W.C.1, and though the tables were published in Leipzig and Copenhagen respectively instructions for their use are given in English. The New York edition is a revised and enlarged one.

J. G. Boggis
A.M.I.E.E. G.I.Mech.E.

BARKING

Work begins on £200,000,000 scheme in Australian Alps

POWER From Snowy Mountains

The scenes above and below, left, show the nature of the terrain in the region of the Snowy Scheme. A view of the township of Cooma, the administrative centre, seen at the bottom of the page, is typical of many to be built

AUSTRALIA'S vast project, the Snowy Mountains Hydro-electric Scheme, is rapidly getting under way. Equipment for the civil construction work has been accumulated over the past months and the preparation of access roads, camps, etc., is well advanced. Work officially commenced on the scheme in October, 1949, although the Snowy Mountains Hydro-electric Authority—which is empowered to carry through the undertaking—only came into being in the preceding July. And, as we briefly announced last week, the first contract for water power plant for the scheme has just been awarded to the English Electric Co. Ltd. This contract is for two 45,000 h.p. vertical reaction turbines, each directly coupled to an alternator rated at 34,375 kVA, generating at 11 kV 3 phase 50 cycles, for installation at Guthega, the pilot station on the Snowy River itself. The turbines, to operate under a head of 810 ft., will run at 428 r.p.m. These sets will be made under English Electric supervision at the Glasgow works of Harland and Wolff Ltd. and delivery of the first unit is scheduled for early 1953.

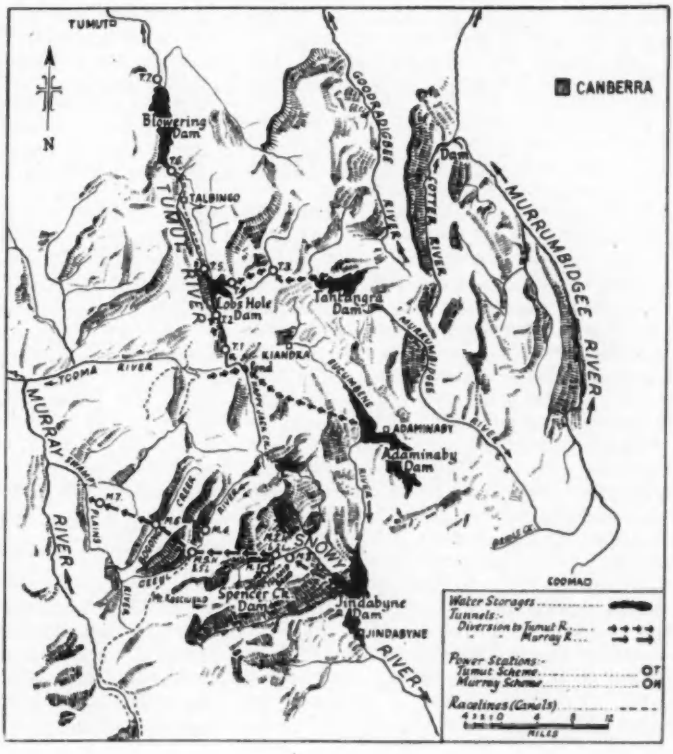
Guthega is the first of 16 power stations in the Snowy Mountains Scheme, which also provides for the construction of seven major dams, 86 miles of tunnels, and 490 miles of racelines. Installed capacity of the whole scheme will be about 2·86m. kW, an amount which is greater than the combined capacity of every steam and hydro-electric generating station in Australia today. Total expenditure is estimated at over £200,000,000, of which nearly £100,000,000 is for transmission lines and equipment.

The Snowy Scheme is based on trapping the Snowy River waters on the high mountain slopes, near to the 6,000 ft. level, and after using the potential power in them for production of

electricity to divert them into the Murray and Murrumbidgee River systems for irrigation use. This principle can best be understood if the scheme is considered in two separate parts: (1) Works linked with the diversion of the Snowy River at Jindabyne through 35 miles of tunnel under the Alps into the Swampy Plains River in the Murray Valley; and (2) works linked with diverting the Eucumbene River, a Snowy tributary, into the Tumut River, which adjoins the Murrumbidgee near Gundagai.

Smiggins Holes Camp shows the working conditions prevailing in many areas. (Right) The map indicates the Snowy River and Tumut River Basins with details of scheme

On the Snowy-Murray Section a dam at Jindabyne of approximately 1,000,000 acre/feet will divert Snowy River water along a 35-mile tunnel under the Alps to Swampy Plains River. In parts the tunnel will be as much as 3,000 ft. below the surface level. Additional water will be fed into it through a shaft at Island Bend, being joined here by another tunnel from a dam at Spencer's Creek, some 6,000 ft. above sea level. More water will be added to the main tunnel where it passes under the gorges of the Gechi and Bogong Rivers, Murray River tributaries. Power will be developed at strategic points in the whole section from nine power stations, with a total capacity of 1,680 MW—all except one of which will be underground. The basis of the Snowy-Tumut, or nothern section of the Scheme, is the diversion of the Eucumbene River from a large storage at Adaminaby by a 15-mile tunnel into the upper Tumut River. Additional water will also be diverted from the Tooma River, a Murray tributary. Power stations will be installed at various points down the Tumut Valley to gain the maximum benefit from these diversions. The upper Murrumbidgee, near Tantangara, will also be diverted through another tunnel into the Tumut near Lob's Hole, generating more power and regu-



lating the flow from the catchment area. Seven power stations in all, with a total capacity of 1,180 MW, will be installed in this particular section of the scheme.

Since its formation the Snowy Mountains Authority has been concerned with two objectives: (1) the early production of electricity, and (2) the early inland diversion of water from the storage at Adaminaby to the Upper Tumut River and the power development on this project.

The first power development will be carried out on a section of the Upper Snowy between the Guthega and Munyang Rivers. A programme of works has now been planned to give some 60,000 kW within the next four years. At the same time continued investigation work, such as geological surveys, will proceed on the Adaminaby-Tumut Pond tunnel line and other activities such as road construction and barracks building will go ahead.

Progress to Date

Too much cannot be said of the work done by the Investigation Committee in formulating its proposals in the short time available, but at the time the Authority was formed the information available was in more or less general terms, with insufficient data on which to base designs for the major work. The Authority has, therefore, placed a special emphasis on its detailed investigations programme and, at the same time, gone ahead on works concerned with its preliminary objectives as speedily as possible. Recruitment of staff has raised some special problems. A nucleus of engineers, surveyors and other technical specialists has been recruited in Australia, but many more have been needed from overseas. The response of general Australian labour in a period of very serious labour shortage has been satisfactory, but turnover has been high, as was to be expected in an area which is remote from what are now regarded as accepted amenities. The general labour needs are so vast—for peak construction years some 16,000 men will then be equipped—that the immigration programme must be looked to to meet the greater part of labour requirements when that time comes.

Cooma, trunk road junction and railhead, some 260 miles from Sydney, has been chosen as the administrative centre and main stores depot for the Authority, and a new township has been completed, including cottages with all-electric equipment and standard fittings which include a hot-water service and electric stove. Area regional townships will also be built at other points.

The scheme is the largest yet to be undertaken in Australia and it ranks as one of the major engineering works in the world today.

ELECTROLYSIS REMOVES RUST

AT the present time, when much equipment is coming up for reconditioning to meet the needs of rearmament, methods of dealing with rust on steel and iron become of special interest and importance. An application of electroplating technique to this problem is one successful method, and the process involved was demonstrated last week at a press conference organised by Derustit Ltd., a unit of the Simon Engineering Group.

Perhaps "electroplating in reverse" best describes the process. The rusted components are immersed in an alkaline electrolyte in a large bath, and heavy current connections are made from them to the negative side of a 7-volt d.c. supply. The tank itself becomes the anode, and a current of about 4,000 amperes is normally passed. A d.c. supply is obtained from an oil immersed metal rectifier fed from a suitable step-down transformer.

Essential to the process is the composition of the electrolyte, which is prepared by Derustit Ltd. It has the important property of leaving the parent metal unaffected once the rust has been removed, and as a result the duration of the cleaning operation is not critical. If rusting is still in its early stages, so that only a very thin layer of metal is affected, in spite of a comparatively thick coating of rust, then components can be cleaned up to conform to previously imposed tolerances of the order of half a thou. This is naturally not possible when corrosion has proceeded to the extent where pitting has occurred, and a smooth surface will not result from cleaning in this case. However, all traces of deposit are removed even from the bottom of pits.

Applications

Rust removal has been mentioned as the principal application of the process, but there are many other deposits that can be successfully removed, including scale from boilers and pipes, sand from inaccessible recesses of castings and concrete remains from the surface of steel shuttering.

The Tools of Physical Research

Stabilisation and consolidation in instrument design is apparent at 35th Annual Exhibition sponsored by the PHYSICAL SOCIETY

ONCE again the Physical Society's Exhibition is being held at the Imperial College, Imperial Institute Road, South Kensington, London S.W.1, from Friday, April 6, to Wednesday, April 11 (excluding Sunday). On the opening day (Friday), the Exhibition will be open to Fellows and Press only from 10 a.m. to 1 p.m., but will be generally open from 2 p.m. to 9 p.m. Saturday, the hours are 10 a.m. to 1 p.m. and 2 p.m. to 5 p.m., preference being given to junior staff. Monday and Tuesday, the hours are 10 a.m. to 1 p.m. and 2 p.m. to 9 p.m., whilst on the last day the Exhibition will close at 5 p.m.

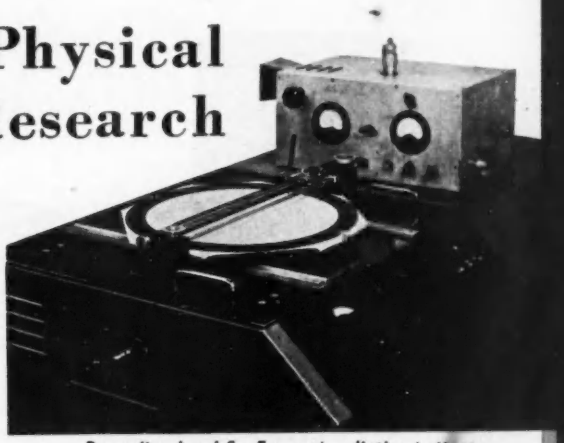
For old physics students of Imperial College, a room (G5) in the Huxley Building has been set aside as a meeting-place for the duration of the Exhibition, and it is hoped that a refreshment room will be available in the same building for the benefit of visitors.

Coming to the Exhibition itself, it is noticeable that this year the attention is primarily concentrated on design improvements and detail developments of existing equipment. In fact, one might almost say that a process of consolidation is going on. Many instruments which last year were experimental prototypes have become commercial models. This is not to say that there are no new items, but the number of "one-off" specialised instruments is somewhat less than in previous years.

As is only to be expected in this present age, the electronic engineer is still foremost in the field and a considerable number of electronic devices such as high-speed oscilloscopes, high-speed electronic counters and high-frequency radio and radar test equipments are present.

A.E.W., Ltd.

Commercial and laboratory furnaces using electric elements as the heating source are available for inspection. A new type of heating element non-inductively wound and capable of being built up in any size to suit particular circumstances is of interest.



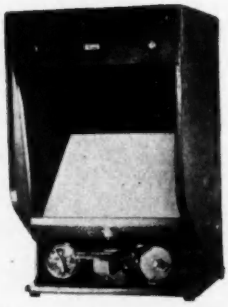
Recording head for Ferranti radiation pattern equipment

Automatic Coil Winder and Electrical Equipment Co., Ltd.

The Automatic Coil Winder and Electrical Equipment Co., Ltd. is showing a wide range of multi-range test meters and various electronic instruments. The new Model 8 Avometer, a 20,000 ohms per volt meter with a very wide coverage of ranges which are capable in many cases of being considerably extended by external accessories, is of particular interest to the electronic engineer. An example of a 100 range electronic test meter known as the test meter Type "W" is shown, this instrument in addition to its enormous coverage of ranges, being capable of giving full scale deflection for 10 microamps at a.c. frequencies into the audio frequency band. Other items of interest are the new Heavy Duty Avometer, a compact 1,000 ohms per volt multi-range instrument; a 4,000 ohms per volt Universal Avominor; a Universal Bridge, and an Electronic Test Unit capable of producing readings of very small values of inductance and capacity. It is also hoped to show a novel form of an accurate production bridge, which can be used in works dealing with the mass-production of resistive components, and a television receiver testing unit capable of checking the aerial system in addition to the receiver circuitry.

Baldwin Instrument Co., Ltd.

This company is concentrating mainly on equipment used in connection with the measurement or utilisation of radiation. The "Atomat"



Above is the new Ediswan Microfilm reader with automatic gate. On the right is the Zenith automatic regulator with electronic control. This is made for single-phase or three-phase supply as required.

beta-ray thickness or weight gauge, is an industrial device which uses a radio-active isotope with a useful life of four years to measure the thickness of sheet material such as paper, board, plastic, metal, foil, etc. For heavier work, such as sheet steel, is the gamma-ray version.

A dosemeter for X-ray tube output is the Baldwin-Farmer substandard with a range up to 60 rontgens. Calibration is accurate within 1% over 50-400 kV X-radiation.

Detection of radioactivity is catered for by a gamma-radiation instrument using a halogen-quenched Geiger tube. Several other instruments are also on view.

British Electric Resistance Co.

Advances in resistance design to enable power type rheostats to be worked at high powers, a hermetically sealed potentiometer rheostat of 5 W dissipation for use in damp conditions, and vitreous resistances, may all be examined at this stand. In addition to the wide range of laboratory and industrial variable resistances, there is also an automatic voltage regulator using a variable auto-transformer with servo mechanism which, used in conjunction with a bucking and boosting transformer, allows control to be exercised over throughputs much greater than that of the transformer itself.

British Thomson-Houston

Several lines of research being investigated in the B.T.H. Research Laboratories are illustrated by the exhibits at this stand. Thus grain size and thickness in silicon iron steel may be examined by an X-ray texture mapping camera; a new ignitron, the type BK56 unit, rated at 20 kV (forward and inverse) with an average current rating of 150 amp, or 900 amp instantaneous, is being used in connection with synchrotron switching, and several types of infra-red detectors for industrial applications are on view.

Precision test gear includes a variable ratio oil-filled capacity divider for use on voltages up to 140 kV peak. This unit is used in conjunction with a portable mains-energised instrument to give peak readings up to 100 kV at 50 c/s. The scale can be calibrated to read r.m.s. values when the wave shape is a sine wave.

Germanium crystal rectifiers suitable for high-frequency applications are also featured. Having a peak rating of 80 V maximum reverse voltage, with a maximum continuous input current of 50 mA, and a maximum peak input current of 400 mA (limited to one second duration), the total capacitance of the unit is on average about 0·5 micro-microfarad. A demonstration shows the photosensitivity of germanium.

Cinema Television, Ltd.

Several instruments are being shown by Cintel. Brief descriptions of these are as follows: an R.C. oscillator and automatic frequency monitor with a range of 10 c/s to 100 kc/s, 30 V r.m.s. in 600 ohms, accuracy

±0·005% ±0·1 c/s; square-wave and pulse generator to give square waves of 1:1, repetition rate variable from 5 c/s to 250 kc/s, pulse widths of 0·05, 0·1, 0·2 and 0·3 microseconds; inductance and capacity bridges; microsecond counting chronometer from 1 microsecond to 1 second, accuracy ±0·005%; phase correction units; electronic frequency meter from 0-150 kc/s, accuracy ±2% full scale; a radiation dosimeter for personal use and a high-voltage surge testing equipment giving a voltage pulse from 500 to 10 kV with a peak short circuit of 75 amp.

E. K. Cole, Ltd.

Shown for the first time is the Ekco aerial polar diagram measuring equipment. This has been developed to provide accurate automatic recording of the polar diagrams of centimetric antennae. As shown the equipment covers a frequency range of from 8,500 mc/s to 9,500 Mc/s, but any convenient range can be covered by the substitution of two units.

Another new Ekco exhibit is a working model of the latest industrial type thickness gauge. Using radioactive thallium 204, it is capable of measuring from 0·0005 in. up to 0·10 in. of paper or the equivalent weights of other materials.

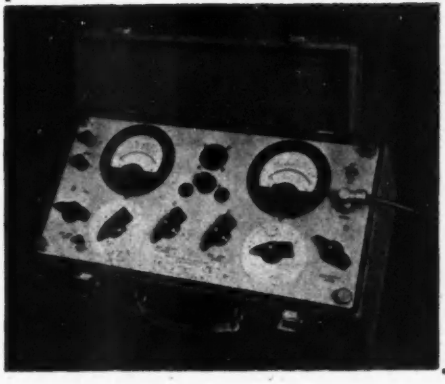
The new Ekco Scintillation Counter uses the E.M.I. photo-multiplier tube 5032, which is contained in a cylindrical lead shield with the amplifier mounted on top. There is also a new portable radioactive ore detector known as the "Ekco Prod." It contains no electronic circuitry, has no controls and no interconnecting cables except for the headphones. Weighing only 3¼ lb, it may be carried in the hand and used as a probe, or slung from the body. It is always ready for use, the only replacement required being the battery, whose life, which is independent of use, is between six and nine months in a temperate climate.

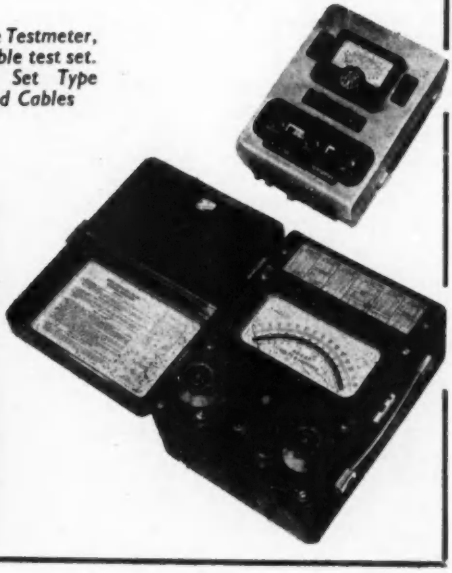
Dawe Instruments, Ltd.

The Type 416 electrically driven tuning fork is a 50 c/s instrument with a low temperature coefficient, and has an accuracy of 0·01%. Several test instruments are shown: the Type 706 panoramic analyser, which automatically separates the frequency components of a complex audio wave and simultaneously measures their frequencies and magnitudes; the type 1406 high-speed recorder, which has a frequency response extending from 30 c/s to 150 kc/s and has three chart speeds, and the type 1501 peak strain gauge recorder, which enables peak strain readings to be indicated on a pointer-type meter from signal pulses as short as ¼ millisecond. The meter indication in this latter instrument can be held with a fall off of only 2% in 10 minutes, until released by a spring-loaded toggle switch.

Several equipments of interest to the photographer are also shown.

On the right, top, is the Avo electronic multi-range Testmeter, and below it is the Sangamo Weston S.75 portable test set. Below is a Maximum Amplitude Measuring Set Type 74700-A exhibited by Standard Telephones and Cables





Edison Swan Electric Co.

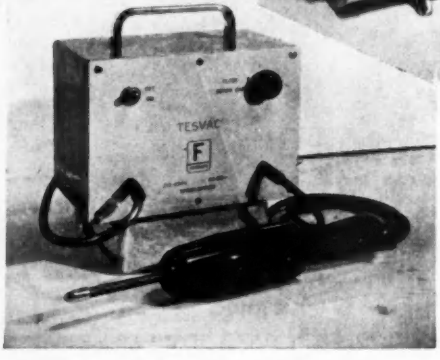
On this stand can be seen a new high-speed recorder with an extended frequency response for direct ink or hot-wire recording. Paper speeds are 1·5, 3·0 and 6·0 cm/sec. and amplitude of response is flat from d.c. to 90 c/s without any noticeable resonance. The low-frequency oscillator-type R.666 covers the range 1·4 c/s to 5,500 kc/s with a frequency accuracy of within ±2% and a constancy of amplitude within ±5% over the range. The demand for portable electro-encephalographic equipment for use in operating theatres, has led to the development of a range of units which will meet most demands.

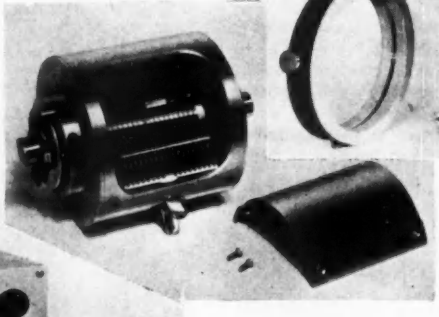
The Edison microfilm reader, with automatic film gate, is being shown for the first time. This is designed to avoid any possibility of scratching the film.

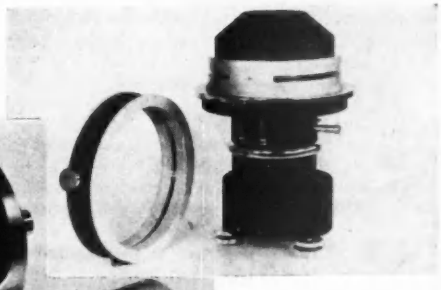
Special valves are being shown and examples of new types of metal to glass terminal seals are on view.

Electrical Research Association

Several research items illustrative of the work being carried out by the Association or under its aegis, are on view. From the Cavendish Laboratory is a "cold chamber" for the optical observation of crystals under conditions relatively free from frosting. Temperatures may be regulated to within ± 0·1° C. down to −140° C. The University of Liverpool is showing a photomultiplier and oscillograph technique developed to investigate the variation with time of the spectral distribution of spark discharges. Queen Mary College, London, is showing a machine for investigating the mechanical stresses set up in insulants, particularly in transformers, and the E.R.A. itself is showing a sphere-anemometer as used in the wind-power investigations now taking place.







Above is the Plessey 19 cm High Temp. X-ray camera with film ring removed, whilst centre is a new Mullard precision variable capacitor. The Ferranti "Tesvac" is seen on the left

Elliott Brothers (London) Ltd.

The Elliott-Shotter inductive system of remote indication is demonstrated. An ultra-high-speed cathode-ray oscilloscope, designed to record single or repetitive high-speed transients, is shown. Sweep speeds range from about 0·05 microseconds to 2·5 milliseconds. Timing and voltage calibration circuits are incorporated in the instrument, and a built-in potential divider allows impulses with amplitudes of up to 30 kV to be recorded.

A galvanometer d.c. amplifier using a photocell bridge system has been developed for use in steelworks or other places where high-speed thermopiles are in use.

Of interest to the power engineer is the Elliott-Petch electrical pressure detector, which is a portable device for providing a positive indication whether or not a high-voltage conductor is alive. It uses an insulated tube containing an indicating cell visible through an aperture in the tube. The cell depends for its action on the fact that if an electrostatic field is applied to mixed dielectrics of differing permittivities the dielectric of higher permittivity will displace the other and move to the strongest part of the field. When the detector contacts a live a.c. cable a red fluid in the cell "humps" in a characteristic manner. If the voltage is d.c. a definite momentary agitation is seen.

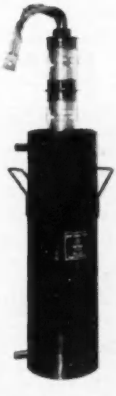
Good indications are given for voltages down to 1,500 V a.c.

Evans Electroselenium, Ltd.

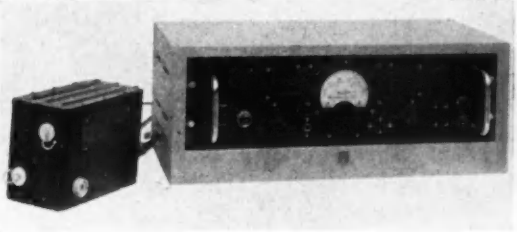
Several applications of photo-electric cells to the measurement of reflectance, glossiness, opacity, etc., are on view at this stand.

Evershed and Vignoles

The well-known "Megger" insulation tester range has been greatly extended by the introduction of a new instrument having three voltage and six megohm ranges. In outward appearance the new instrument is very nearly the same as the ordinary Series I type; it includes, however, a six-position range switch, facilitating tests at pressures of 500 V (0-50 and 3-10,000 meghoms), 1,000 V (0-100 and 5-20,000 meghoms), and 2,500 V (0-200 and 15-50,000 megohms). Another new instrument is a quick response recorder, having a maximum sensitivity of ± 1 mV a.c. or d.c. The recording movement incorporates a two-phase induction motor instead of the moving-coil movement used in previous instruments, which had a sensitivity of only ± 10 V d.c. A drag-cup generator coupled to the movement facilitates variable damping. The new recorder, which will follow frequencies up to 10 c/s, is intended for working from high-speed thermo-couples or strain gauges.



On extreme left is the Newton Victor Resomax 300 X-ray tube contrasted with the NVK-3 diagnostic type. Left is B.T.H.'s Type BK56 Ignitron and below is a Valve Electrometer type instrument for ionisation current measurement by E. K. Cole



Other exhibits include a selection of special fractional horsepower motors for d.c. and a.c. operation, and examples of the Series 4 ranges of "Megger" insulation, earth and earthometer testers introduced about a year ago.

Everett Edgcumbe and Co.

Developments in the past year have been mostly in detail improvement of existing designs. On show are the disc-scale (270°) moving coil movement; the speed and time interval grapher, as used by British Railways for checking train times and speeds; the electrostatic wattmeter as described in the I.E.E. paper given by Arvon Glynne and J. K. Choudhury a week or so ago; an electrical accelerometer or rate of change indicator; and numerous other measuring instruments.

Ferranti, Ltd.

Particularly interesting in the field of aeronautics is the Ferranti Radiation Pattern Recorder, a device for plotting the radiation characteristics of aircraft aerials. By using a model and scaling down the wavelength accordingly, the time and labour required to obtain the information from a full-scale aircraft is avoided.

For use in automatic servo control is the "Servopack," an equipment consisting of a detector unit and amplifier unit, a control box and a motor unit which provides both the anti-hunt feedback voltage, and a maximum output of 25 oz-inches static torque. The response time is less than 0·25 secs.

An addition to the range of clip-on ammeters is a new instrument designed for use on porcelain-clad fuses which are normally too large for the standard type of meter. Seven ranges up to 1,000 amps a.c. are provided.

The solution of logical problems on a restricted scale is demonstrated by the logical computor, a slow speed relay type unit with a capacity of seven two-state variables, and other items to be seen are the Tesvac, for checking high vacuum, and a portable viscometer.

General Electric Co.

As is only to be expected from a large research organisation such as that operated by the General Electric Co., a large number of interesting demonstrations and several new equipments are on view. Processes include the piercing of diamonds by an electric spark to produce holes of small bore (down to 0·0002 in. dia.) for wire-

drawing purposes. The measurement of the thickness of thin metal films on insulating surfaces is facilitated by using a thermionic oscillator, the frequency of which is determined by the presence of the film. By beating this frequency against a standard oscillator and thus obtaining a measurement of the thermionic oscillator frequency it is possible to estimate the metal film thickness. An example of the work done by this machine is the measuring of the thickness of the aluminium backing on a cathode ray tube screen. Some of the work being done on crystal valves —both of the silicon and of the germanium types—is exemplified by several exhibits, and several specially designed items of test equipment for radio work are on view.

Finally there is a range of fixed vacuum capacities for use in high power, high frequency circuits. These range from 50 p.f. to 400 p.f. in steps of 50 p.f. Peak voltage rating is 12·5 kV and r.m.s. current rating, which decreases with increasing frequency, varies from 75 amps at 2 Mc/s to 30 amps at 25 Mc/s.

Metropolitan-Vickers, Ltd.

The M.-V. display will include the type MS3 Mass Spectrometer, designed primarily for determination of the abundance ratios of stable isotopes in the mass range of 1 to 70. The controls for electron emission and ion acceleration have been designed to give an accuracy of within ±0·5% when determining the abundance ratios of N, O and C by the single-collector method.

An electron diffraction camera employing a hot cathode electron gun with improved image contrast is also shown.

On the instrument side is a 250 kV sealed-off vacuum electrostatic voltmeter, a Verimag permeameter giving B.-H. measurements within the range 0·5 to 1,500 oersteds.

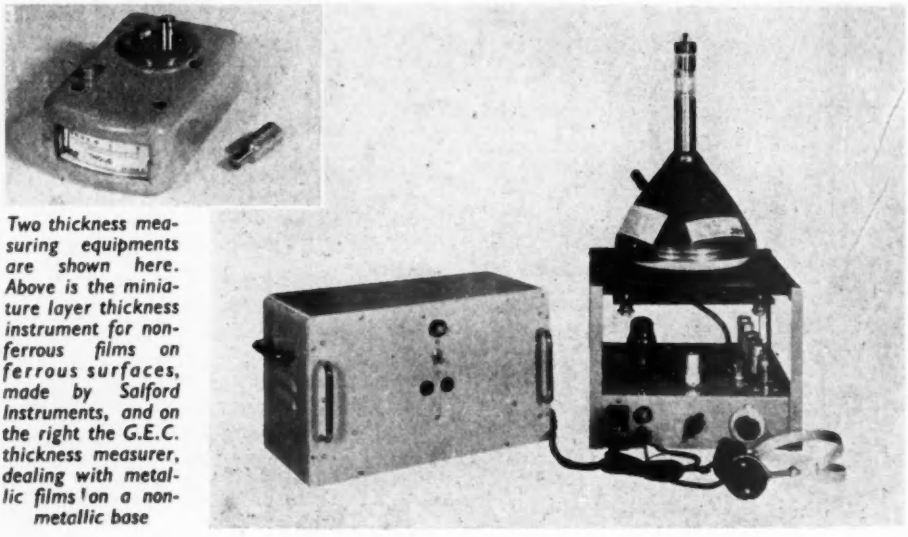
X-ray equipment is represented by an analytical micro-focus X-ray generator, a commercial prototype developed from a laboratory model exhibited in 1948. The tube is operated at 50 kV and the size of the final focal spot is a rectangle about 0·1 mm by 0·01 mm, giving an intensity of about 35 kW/mm².

Mullard Electronic Products

Important among the numerous instruments on show are a wide band oscilloscope for the observation and measurement of the waveform of high-speed transients, an electronic polarograph for the rapid determination of the concentration of metallic ions in solution, and an electronic temperature controller, providing an accuracy of ± 0·02° C.

Other exhibits will include a range of radiation counter tubes and a completely new precision variable capacitor which can be used in measuring equipment requiring the highest possible accuracy.

A special demonstration will also be given illustrating the ultra-violet transmission of synthetic mica to show the higher transmission than that found with natural mica. This high transmission may make synthetic mica a direct substitute for quartz for u-v work.



Two thickness measuring equipments are shown here. Above is the miniature layer thickness instrument for non-ferrous films on ferrous surfaces, made by Salford Instruments, and on the right the G.E.C. thickness measurer, dealing with metallic films on a non-metallic base

Nalder Bros. and Thompson

Specially designed to give the operating engineers an indication of load conditions with respect to generator capacity and stability is an alternator stability indicator. This instrument is essentially a "Vectormeter" with a modified scale which also embodies the power chart of the alternator at normal and limiting voltages.

Several indicators for remote measurement and their ancillary equipment are exhibited, together with numerous switchboard instruments of all types.

Newton Victor, Ltd.

X-ray tubes and rectifying valves for industrial, medical and scientific purposes are being exhibited. At one extreme is the 54 in. long multi-section, sealed-off "Resomax -300," deep X-ray therapy tube designed for operation at 300 kV peak, and at the other is the "NVX-3" diagnostic medical X-ray tube, only 4½ in. long.

A special exhibit is an X-ray tube casing cut away to show its internal arrangement. New tubes have been designed for crystallography and medical purposes.

On the rectifier side are air and oil-insulated h. voltage valves, and special types for use in electron microscopes, one of which is the recently developed type MV012 which has a filament emission of 30 mA with the low voltage of 1·75 V.

Philips Electrical, Ltd.

This exhibit is devoted to a series of diagrams explaining the method of operation of the travelling wave linear accelerator developed at T.R.E., Malvern, and A.E.R.E., Harwell. This type of equipment is being used for the treatment of cancer and machines are under construction for the Ministry of Health.

The Plessey Co., Ltd.

For use at the Royal Aircraft Establishment, Farnborough, is a new engine speed indicator. This is an electronic counter capable of measuring shaft speeds up to 20,000 r.p.m. up to the nearest ten. It uses a NT-cut crystal as a time reference.

Also exhibited are a selective amplifier, a v.h.f. wattmeter, a high-stability power supply and a selection from the Breeze range of components. In addition there are two X-ray cameras (one for high temperatures), "Caslam" magnetic core material, moulded track variable resistors, Tantalum electrolytic condensers, and high permittivity ceramics.

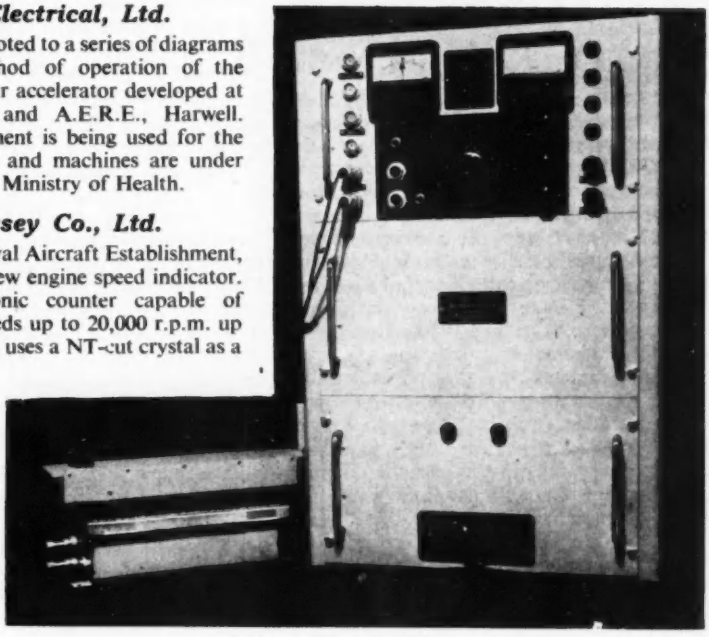
Salford Electrical Instruments, Ltd.

Switchboard instruments are represented by a new 6 in. panel mounting range with all-glass fronts. These can be obtained as ammeters, voltmeters, wattmeters, p.f. meters, frequency meters, tap-position indicators and a synchroscope.

A new instrument for measuring voltages at high-frequency is a mains-operated valve voltmeter capable of covering the range 1·5 to 150 V in five steps at frequencies between 50 c/s to 150 Mc/s and also on d.c. A further intriguing instrument is the miniature layer thickness meter for checking the measurement of non-ferrous layers on ferrous bases. The meter is available in ranges of 0-5, 0-10, and 0-30 thousandths of an inch.

Sangamo Weston, Ltd.

Apart from the well-known range of standard Weston instruments, the firm is showing this



This is the "Atomat" industrial gauge and measuring head, made by Baldwin Instrument Co. for thickness and weight measurements

year several special items designed for use in aircraft. Two types of Weston standard cell are on show; the normal or saturated cell giving 1·01824 V at 20° C. and a standard or unsaturated unit e.m.f. 1·0186 V at 20° C. The latter is more suited to industrial requirements. For light-measuring equipment is the S.123 photronic cell, 45 mm diameter, which has outputs ranging from 80 to 140 μA at 40 ft/candles and 1,600 ohms external resistance.

Worthy of note is the S.75 multi-range test set, which has 53 ranges for measuring a.c. and d.c. current and voltage, resistance and insulation. The sensitivity is 20,000 ohms/V d.c. and 1,000 ohms per V on a.c. The ranges are unusually wide, running from 0-75 mV to 0-1,500 V, and 0-75 microamps to 0-15 amps in d.c., and 0-7·5 V to 0-1,500 V, and 0-75 milliamps to 0-15 amps a.c. The six resistance ranges run from 0-500 ohms to 0-500 MΩ.

Siemens Electric Lamps & Supplies

Several demonstrations on show include the response of some new phosphors with peak emission in the red region of the spectrum; characteristics of barretters for constant current stabilisation; high speed flash tubes, refractory filters and coatings for the diffusion of light using finely divided silica for high-temperature sources, and a mask-type spectral bound photometer employing barrier layer photo cells arranged to read in the ultra violet and visible regions.

Standard Telephones and Cables

Most of the items being exhibited by Standard Telephones and Cables, Ltd., are for use in the electronic field. A production item is the type 74700-A maximum amplitude measuring set, which will measure the maximum amplitudes of rapidly rising a.c. or d.c. voltages, provided that the time of rise from zero to peak is at least 2 millisecs. For checking 48- and 60-channel carrier-on-cable telephone systems is the type 74125-A oscillator, and for the television engineer is the type 74800-A television waveform generator.

Of more interest to the power station engineer is the type 74701-A acoustic mill feeder controller which is designed to control the feed rate to pulverising mills to ensure optimum operation. In the past the quantity of fuel within the mill has been estimated by the operator who has used the volume noise made by the mill as a criterion of the amount of fuel present. This equipment uses a microphone connected via an amplifier and a filter to a sensitive relay which determines whether the noise is higher or lower than a predetermined level. The relay controls a slave relay whose contacts can be connected in the field circuit of the feed motor.

Sunvic Controls, Ltd.

Among the working demonstrations featured on this stand are cold-junction thermostats, electronic galvanometers, electronic reference units and network analysers. The cold-junction thermostat consists of a block of aluminium held at a constant temperature by a special thermostat with a long-term accuracy of better than 0·1° C. The electronic galvanometer has a sensitivity great enough to detect less than 1 microvolt, and the electronic reference unit provides a current which is kept constant to within one part in two thousand by continuous comparison with a standard cell. The network analyser is designed to measure the phase frequency characteristics of a four terminal network at low frequencies. It can be used for analysis of servo systems and feedback amplifiers and is demonstrated in conjunction with the Sunvic d.c. amplifier.

Telegraph Constr. & Maint. Co.

The company's exhibits show the application of high magnetic saturation alloys in electrical equipment where a high power/weight ratio is required. Examples of aircraft generators and starters are displayed in which a weight saving of 1/5th is achieved by the use of iron-cobalt alloys instead of iron. Even greater reductions in weight are envisaged.

The company has developed special apparatus to facilitate the comparison of hysteresis loops of magnetic materials.

Zenith Electric Co., Ltd.

A new type automatic voltage regulator, for operation on 3-phase circuits and designed to give a constant output controlled within close limits and insensitive to reasonable frequency variations is on show. An electronic relay is used to control a motor-driven toroidal variable transformer, regulating the output to an auxiliary booster system. The largest model handles loads up to 60 kVA, and the voltage is automatically maintained within limits of 1% with input variation range up to 20%.

The latest types of "Variac" adjustable transformers, incorporating the new low-loss magnetic materials and arranged both for manual and remote control are being demonstrated, as well as an improved insulation testing set, with special electronic additions to ensure non-destructive a.c. testing.

Notes on Wiring
by MEGOHM

FACTORY REPORT - 1949

Some notes on H.M. Chief Inspector's latest Report

HAVING studied, as is my custom, the annual report of H.M. Chief Inspector of Factories, which was reviewed in the ELECTRICAL TIMES dated March 15, it is once again regretted that the publication of this important and informative document lags so far behind the period actually covered.

As the purely statistical tables, instructive and valuable as they are, give only an overall picture of the reasons why accidents occur, the most interesting parts of the report to my mind are those brief and succinct paragraphs giving a clear picture of some everyday occurrence which was the prelude to some particular accident. Most of these indicate that the usual human failings, ignorance, carelessness, familiarity and lack of foresight, are responsible in practically every case.

It is abundantly clear from the report that the inspectors have used every means at their disposal to anticipate and prevent accidents, by giving timely advice and helpful suggestions. This service is particularly valuable.

Value of Maintenance

Although the larger firms are aware of the necessity and value of proper maintenance, regular inspection and test of plant and installations, it is clear from the report that many of the smaller firms lag far behind in this respect, and I can affirm from personal experience that so long as a thing works it is often left without any attention whatsoever. As I have so often stressed on this page, regular and systematic maintenance of electrical plant and installations is a worthwhile insurance, and more should be done by the average contractor to induce this type of business, rather than wait until he is called out after a mishap.

The accident trend in one division discloses the curious fa.t that 50 per cent. of the injured persons are electrical staff, nearly all of them experienced working electricians. The percentage of permanent maintenance men and outside contracting staff is not given, but the high figure seems to prove the old adage that familiarity breeds contempt.

Specific Cases

As might be expected accidents in connection with portables and their associated component parts form a large proportion of those briefly enlarged upon. Of these two from Scotland merit special attention, as they both resulted in a fatality, and are an everyday possibility where lampholder adaptors are fitted to appliances having 3-core flex and exposed metal connected to the third core.

In the first instance, the upturned end of the live conductor touched the end of the earth wire, and in the other case the end of the earth wire came into contact with the live terminal. The same fault might as easily occur with a two-pin plug top, and indicates the danger that may ensue if care is not taken to cut back the unwanted end of the earth continuity conductor. Although a printed slip usually indicates the purposes of the green lead, it is too often left to the casual customer without any technical knowledge to fit the plug top or other connecting agent, and the vendor of the appliance is under a moral obligation to point out the hidden danger which exists if a 3-pin plug top is not being used with a 3-core lead.

Two instances are given where portable leads were damaged because heavy material was dragged across them, and on one building site in response to the inspector's advice things were made "a little safer"—to quote the report—by drawing loose wires into rubber hosepipes and slinging them up out of the way.

One bright improvisation was where an old lamp was used to act as an adaptor feeding a 3-pin plug top, by the simple expedient of breaking away the glass of the bulb, removing the filament, and jamming the two filament supports into the slots of two circuit pins of the plug-top. Fortunately, no one was hurt.

Finally—and this item should by rights be in the Health and Welfare Section—at one works the electricians made up some immersion heaters for tea-making by the simple process of driving two nails through a piece of wood and bridging them with resistance wire. Fortunately, again, no one was hurt or even poisoned.

THE D.S.I.R. ANNUAL REPORT 1949-50

Continuing Expansion of Department's Interests

THE Report of the Advisory Council of the Department of Scientific and Industrial Research for 1949-50 has been recently published (H.M.S.O., price 4s. 6d.), and although much of it is concerned with industrial processes and research unconnected with electrical engineering, it is well worthy of note if only to show the wide range of interests with which the Department is connected.

A point of more than passing interest is the increasing attention being paid to physiological and sociological factors in industry, particularly as far as productivity is concerned. Apart from lighting and colour in factories and conditions of work, numerous questions have arisen which have a definite sociological aspect. Many of these involve research on health and disease, and accordingly, discussions have been held between the Medical Research Council and the Department, and a joint survey of the research in progress has been undertaken.

Specific Research

A brief review of activities of all the Research Associations is included in the Report, but in the following we have abstracted only those sections which have an electrical interest.

The Building Research Association has carried out further studies on the application of electro-osmosis, i.e. the flow of water under an electrical gradient to improve the stability of earth slopes. Work has also been carried out on the lighting of factories and effective demonstrations performed, notably in a woollen weaving mill near Huddersfield.

Recent developments in crystal technique for radio and radar equipment has led to the Radio Research Board requesting the Chemical Research Laboratory to carry out investigation into the purifying of germanium. Consequent on this, experiments are being carried out on the extraction of germanium and gallium from flue dust.

As is to be expected, much work is being carried out by the Fuel Research Station on the utilisation of coal in gas turbines. Two types of combustion chamber are being studied: the F.R.S. Vortex Combustion Chamber, and a straight through chamber fitted with the F.R.S. Grid Burner or Multijet Burner. The former has been designed to burn 500 lb of coal/hour at atmospheric pressure with a heat release of about 500,000 B.Th.U. per cu ft per hr. Joint research with the E.R.A. on the grindability of coal has continued.

National Physical Laboratory

Much of the work in progress at the N.P.L. is, of course, mentioned in the annual report of that establishment. The Electrical Division has provided a system of automatic monitoring of the three standard broadcast signals of 60, 5,000 and 10,000 kc/s and during the first five months the frequencies have been maintained accurate to one part in a hundred million relative to the N.P.L. frequency standard.

Apparatus has been constructed for dielectric measurements at frequencies up to 10,000 Mc/s to help in investigating the mechanism of power loss in dielectrics. Owing to the increasing use of h.f. power in industry and in aircraft, a study is being made of suitable measuring instruments.

The A.C.E. pilot model electronic computer is under exhaustive testing and the next step will be the development by the electronics section of an increased storage capacity of about 70,000 binary digits.

Turbines and Alternators

An interesting section of the Report is that dealing with the gas turbine research being carried out by the Parsons and Marine Engineering Turbine Research and Development Association. Most of the work is naturally concerned with steam turbine machinery, but on the gas turbine side PAMETRADA has designed and built a 3,500 h.p. unit to drive the ship's propeller directly, and this machine is still undergoing extensive tests. At the moment diesel oil is being used, but shortly boiler fuel oil will be burnt, and it is hoped ultimately to advance to really heavy fuel oils.

Intensive investigation is being carried out into troublesome vanadium ash deposits which at gas turbine temperatures tend to choke the blade passages and under certain conditions attack the constituents of the high temperature alloys used in the construction of the machine.

Creep in turbo-alternator windings is under investigation by the British Non-Ferrous Metals Research Association. A possible improvement appears to be in using a certain amount of silver with the copper and by the use of cold-worked material.

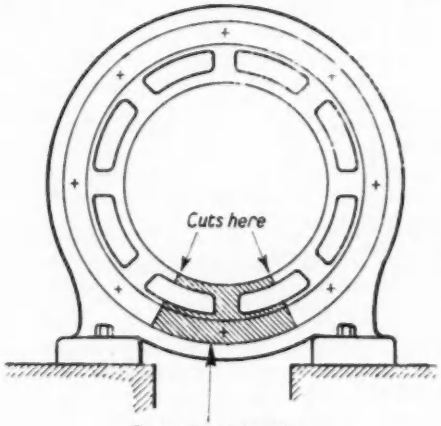
Problems and Practice

IN ENGINEERING

Solid End-Bracket Obstructs Repair

IN the event of a repair being necessary to a heavy motor or generator a great deal of work and cost can be saved if the repair can be carried out without uncoupling the machine or moving it on its bedplate. The construction of the electrical machine alone sometimes makes this course very difficult.

Recently we had to carry out repairs to a salient-pole alternator working in a woollen mill, driven from the rope race. A stator coil in the lower part of the machine had failed between turns, fortunately outside the slot. It was decided to repair the coil without moving the machine or removing the rotor, if possible. The fault was at the pulley end of the machine, the pulley being separated from the machine by a pedestal bearing. The end-brackets of the alternator were of one-piece castings, and owing to the proximity of the pedestal the end-shield at the driving end could not be moved away from the winding sufficiently to allow access to the faulty part. It

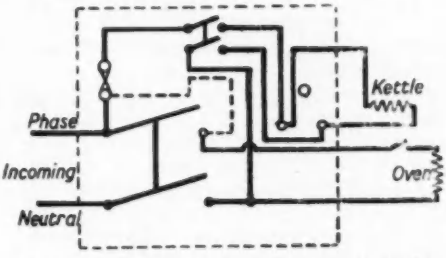


Position of cuts in the end bracket

was decided that the quickest solution to our difficulties would be to cut away part of the end-bracket to allow it to be lifted clear of the machine. This was done by cutting the casting as shown in diagram by oxy-acetylene flame, the windings being protected from the heat of the flame. This work was successfully carried out, and the repair completed at far less cost and more expeditiously than would otherwise have been possible. Had the end-bracket consisted of several sections instead of being of one casting, even more time and trouble would have been saved.—*B. T. R.*

Cooker Control Wiring

A FEW days ago I had, what was to me, an unusual fault to locate. It concerned a housewife who complained that she had received an electric shock whilst cleaning the



Cooker control circuit showing wrong connection

oven of her electric cooker, despite the fact that the double pole cooker control panel was in the "off" position, the control panel being of the type that incorporates a 3 pin 15 amp d.p. switched socket-outlet.

I took off the front of the control panel to inspect the wiring and found that it was a little unorthodox inasmuch as that the socket-outlet circuit was not looped entirely from the outgoing side of the main 30 amp d.p. switch in the control panel, but was wired as shown in diagram.

After changing the fused leg of the kettle circuit to the outgoing phase terminal of the 30 amp d.p. switch, shown dotted in diagram, I asked the lady of the house if she could remember whether the kettle was plugged in and switched on at the time she received the shock, and she concurred that that was the case. She said she had paid particular attention to the circumstances because she could not understand why on previous occasions she had not received a shock when the d.p. switch was in the "off" position.

It can be seen that this fault in the wiring

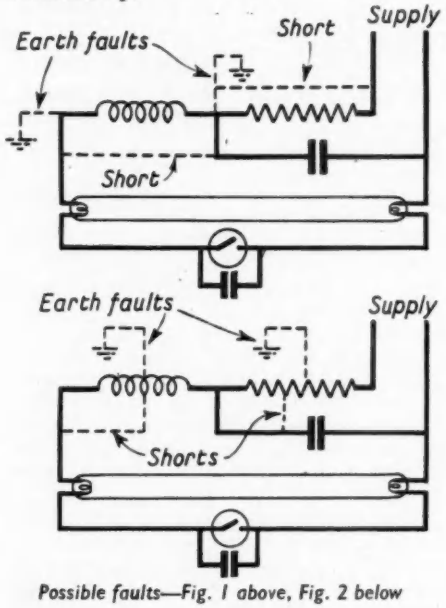
explained the nature of the "live" oven because the outgoing neutral to the oven was then in series with the kettle which was in turn fed from the incoming phase conductor and the fact that the oven switch was also in the "off" position did not affect the condition as it was of course on the other side of the cooker element.—*G. Y., Watford.*

Fluorescent Testing

I WOULD like, if I may, to comment on your correspondent "Sigma's" note published on March 15th.

First I would like to thank him for explaining why a glow type fluorescent starter will only operate with current flowing in one direction (d.c.).

I am afraid I do not agree with him about his alleged "errors" however. I suspect that "Sigma" is something of a theorist, whereas I am a practical man. The practical electrician's job is to diagnose, locate and correct faults, and furthermore, to do this in as short a time as is possible, consistent with good workmanship.



Possible faults—Fig. 1 above, Fig. 2 below

Consider then the case of the man who goes (perhaps several miles) to attend to a faulty fluorescent fitting, and on arriving, finds that the faulty fitting is the only one on the premises. Is he then to take the lamp and starter back to his shop to try them in a good fitting? Or is he to carry around a formidable assortment of chokes, resistors and capacitors so that he may try the suspect components in a "lash-up" circuit on the job?

There are testing sets available, of course, and our electrician could use one of these (if one of his colleagues is not already using it on another job). To a practical man other methods will suggest themselves.

The only fault conditions under which a new lamp could be damaged are,

(a) When a short or earth fault has cut the ballast out of circuit (Fig. 1), or, (b) When an internal short or earth in the ballast has reduced its effective value (Fig. 2).

In the case of (a) the old lamp would have one or both heaters destroyed (and so would a new one if inserted), but the refusal of the old lamp to make any attempt to strike whatever, should warn the electrician of the possibility of this fault and deter him from simply "replacing the lamp."

In the case of (b) the old lamp would have been overrun, causing premature failure, but "Sigma's" advice of trying the lamp in another fitting is utterly useless here because it would behave as a lamp which has had its normal life.

In the case of which I wrote (Feb. 15th issue), the lamp did flicker and occasionally strike and work normally, thus ruling out the possibility of a shorted ballast.

Happily, faults in control gear seem to be very few and far between these days, the trouble is nearly always due to lamp or starter.

I hope I have shown in the foregoing, that providing a little common sense is used, new lamps can be tried in many cases without risk.

"Sigma" also stated that there was an error in the wiring of my circuit, but this was not the case. The diagram given by me showed the circuit in its original form with a glow type starter. The mere fact of changing the starter to a thermal type converts the circuit to precisely that shown by "Sigma."—*James Garside.*

Jointing Of Pipes

MANY types of jointing materials are to be found in power-station practice, and sometimes difficulties are experienced when joints have to be broken. The writer has found that a manganese paste makes a very sound job, but that it is advisable to apply only a thin "worm" of paste on the centre of the joint face; otherwise difficulty will be experienced when the joint has to be broken. To overcome this it is better for the remainder of the face to be smeared with the more usual graphite or other compound.—*M. I. C. E.*

MASS-PRODUCTION CONTRACTING

Specialised Methods Used in Wiring a 17,000 unit U.S. Housing Estate

MASS PRODUCTION methods used in the task of wiring a housing project near Long Beach, California, are described in the issue of *Electrical Construction and Maintenance* for February, 1951.

Planned for an ultimate of 17,000 houses, the Lakewood Park Estate is being built in groups of 1,600 houses, more than 6,000 having been completed in the first eight months. The entire wiring contract is being handled by one contractor, the Kuster Wetzel Electric Co., and the specialised methods involved make interesting reading. Since the construction of the houses is in the hands of two separate building contractors, the electrical contractor's men are divided into two separate groups, each operating in the area allotted to one builder.

Each group consists of 50/60 men under the control of a general foreman, operating from their own field workshop, and each group is sub-divided into crews specialising in one operation, although the crews are changed round periodically to avoid loss of efficiency due to monotony. The operations into which the work has been split are:—

1. Pre-assembly work.
2. Service intake installation.
3. "Spotting" outlets in the houses.
4. Mounting of boxes.
5. Drilling holes for cable runs.
6. Installation of cables.
7. Connecting and splicing.
8. Installation of outlets, switches and fixtures.

Pre-assembly took place in the field workshops, where material was delivered direct from suppliers. With the mild Californian climate it was possible to use a weatherproof cabinet which, in addition to providing mounting space for the supply company's watthour meter, also contained the main distribution gear. This distribution gear consisted of four 15-20 amp s.p. circuit-breakers for the branch circuits, and also allowed space for a future 2-pole breaker to take care of a cooker as and when this was installed.

These cabinets were fixed outside the house with an intake consisting of three No. 8 (approx. 10 SWG) conductors encased in a vertical conduit which projected through the eaves of the house to form a "mast" for the tappings to the line. Factory-wired internally, the cabinets had the leads and the length of conduit (obtained in bulk by sawing bundles of conduit in half) assembled in the field workshop, at the rate of 50 per man per day, when actual installation at the house took only 10 minutes plus 10 minutes for earthing.

Ceiling outlets and hangers were assembled on a bench jig, banded together in quantities sufficient for one house, together with the necessary wall boxes and delivered in cardboard carrying boxes to each house by lorry. A similar scheme was used for plug sockets, switches and fittings.

Tools and Methods

Extensive use was made of power tools, wherever possible. At the commencement of the job, before power was available on the site, portable generator sets were used and, later on, when the distribution lines were in, temporary service poles were erected to provide a supply. It is stated that even the few seconds saved by the use of automatic ("push type") screwdrivers and wire strippers made an impressive contribution to the total time saved. It is also stated that pre-cutting of cable to length for branch circuits was considered, but rejected on the grounds of possible dimensional variation between the houses. Cable was, however, supplied on pay-off reels arranged for hanging to the rafters, and this, it is stated, resulted in considerable economy in cable.

Specification

The houses in question are frame construction single-story, with an area of 850 sq ft for a two-bedroom house and 1,050 sq ft for the three-bedroom type. Average number of outlets, including garage, is given as 20 socket outlets, 15 switches and 10 ceiling fixtures. Non-metallic sheathed cable was used, the sizes being No. 12 (approx. 14 s.w.g.) for power and No. 14 (approx. 16 s.w.g.) for lighting circuits, and the estimated time for complete wiring was 18-20 man-hours per house. An average group of 50 men is stated to have wired 27 houses per day, completing 3,000 houses in five months working a five-day week without overtime. Under peak conditions a group disposed of 35 houses per day.

overseas news

Singapore's Need

Concerned at the urgent need to obtain additional generating capacity, Singapore Municipal Commissioners have asked the Government for top priority in the supply from the U.K. of equipment for electricity extension schemes. In this connection Mr. T. P. F. McNeice, the municipal president, is now in Britain visiting the firms making plant for the new Pasir Panjang steam generating station. Black-outs in Singapore have increased of late, and rationing of electricity is seriously affecting the activities of small industries, it is reported.

N.S.W. Expansion

The possibility of establishing an additional coal-fired generating station near Gunnedah is under consideration by the State Electricity Authority of New South Wales, Mr. V. J. V. Brain, chairman of the Authority, revealed last month. He outlined the need for expansion of generating capacity in the North and North-west, and pointed out that the Tamworth power station, at present having a capacity of 18,000 kW, would be raised to 21,000 kW within the next three months, but could not practically be extended beyond 23,000 or 25,000 kW. It was estimated that the load would be double that amount within seven years, so that a further station was necessary. This would cost about £5,000,000. A site a few miles out of Gunnedah and within easy reach of Curlewis and Gunnedah coal-mines was being considered. This station would be supplemented by a smaller hydro-electric plant on the Oaky River, near Armidale, with a capacity of about 3,000 kW and a small plant at Keepit Dam. He added that it was possible later that a third coal-fired generation plant would be constructed at Ashford, near Inverell, where a county council was developing coal deposits.

Another Fuel Problem

Expert advice on the hairlines of sand found in the brown coal seam now being worked at Yallourn is being taken by the State Electricity Commission of Victoria. We have already reported that this flaw in the fuel has caused a reduction in generating capacity—contributing to the State's need for power cuts. It is stated that these hairlines showed up only in the past few months and, according to Mr. R. A. Hunt, the Commission's chairman, may continue to be mined for at least 18 months. Under heat in the furnaces, the coal and sand—almost pure silica—forms sticky, spongy masses. The deposits grew until they were two or three feet thick and weighed up to three tons. Sometimes they fell and smothered the firing grates, and workmen had to go inside, at some danger, to clear away the resulting debris, it is reported.

Another Industry

A plant to manufacture a wide range of electrical accessories for all types of transport vehicles will be established in Melbourne by Joseph Lucas Ltd., of Birmingham. Mr. J. Masterton, a director of the company, stated when visiting Sydney recently. A branch factory is to be established in Sydney.

Control System

The State Electricity Commission of Victoria plans to adopt the ripple control system for installation in the Melbourne metropolitan area. This is for the control of off-peak water heating. Initially, the system will cater for about 5,000 consumers.

Acquisition

The Electricity Trust of South Australia has advised the Moonta Town Council that it is prepared to accept the corporation's offer of £12,500 for the whole of its electricity undertaking, excluding the powerhouse. Stocks of fuel and oil will be purchased separately. The corporation had previously decided to retain the powerhouse, but had intimated that it was prepared to let the Trust have free use of it until the installation of the a.c. service for the town and district had been completed. The powerhouse, which was established in 1917, contains diesel sets. Officials of the Trust are expected to visit Moonta soon to complete arrangements.

A Rural Reserve

As was foreshadowed (ELECTRICAL TIMES, February 1), the Saskatchewan Provincial Government has decided to henceforth restrict the erection of power lines outside city, town and village limits to the Saskatchewan Power Corporation. In future, municipalities, power companies and others will not be permitted to extend their lines beyond the borders of cities, towns and villages except in special cases where those undertakings could serve the loads more economically. The Public Works Minister, Mr. J. A. Darling, who is in charge of both the Saskatchewan Power Corporation and the Power Commission, said a "very extensive" network of power lines is now owned and operated by the Saskatchewan Power Corporation. Plans were being made by the Corporation for the further extension of lines to form an integrated system which will eventually cover the whole province. The new policy was thought advisable so as to avoid or reduce to a minimum any "conflict" with the overall provincial plan, he declared. The Saskatchewan Power Commission

exercises regulatory functions in connection with provincial power systems which are not a part of the Saskatchewan Power Corporation.

Canadian Production

The Swiss company, A. G. Brown Boveri, of Baden, proposes to erect a plant in Canada for the manufacture of compressed air switches and possibly small transformers, it is reported. Apparently the company has purchased an area of 276,000 sq. metres at St. John, south of Montreal, and plans initially to build two factory buildings there.

Delhi State Board

A State Electricity Board has been set up for Delhi to take over the functions of generation and supply of electricity from Delhi Central Electric Power Authority Ltd. The Board is comprised of a chairman and two members, who will be advised on major questions of policy and important schemes by a local Electricity Council consisting of seven members, representing the electric supply industry and labour, commerce, transport and agriculture. The chairman of the Board will be *ex-officio* chairman of the Council. This decision has been taken by the Government of India under the Electricity (Supply) Act of 1948, which provides for the setting up of such powers in every State. The one proposed for Delhi is the first in Centrally-administered areas. Mr. B. Paul, A.M.I.E.E., formerly the general manager of Delhi Central Electric Power Authority Ltd., took over duties as chairman of the Board on March 31.

Mysore's Programme

It is hoped to complete the second stage of the Mahatma Gandhi hydro-electric station at Jog by the end of this year, Mr. M. Hayath, chief electrical engineer to the Government of Mysore, stated a few days ago. This will bring the station's capacity to 120 MW. He also referred to the plan for the conversion from 25 c/s to 50 c/s of the system in the area at present served by the Sivasamudram and Shimsha power stations. It is expected that this work will be completed within three or four years apart from the Kolar Gold Mines, which will continue to be served at 25 c/s, as conversion would cost some tens of millions of rupees. By this conversion to 50 c/s, Mysore would become uniform with rest of India.

Rat Repellant Wanted

Are rats more voracious in New Zealand than in this country? It would seem so judging from discussion at the annual conference of the New Zealand Institute of Electricians in Christchurch last month. Here, one member recalled that rats in north Auckland had attacked electrical installations to such an extent that the cores had been exposed for up to 6 in. in length, causing fire hazards. He urged that legislation be invoked to prohibit the use of cables which could be so easily damaged. Support was given by Mr. H. D. Boddington, who said that he had seen not inches, but yards of T.R.S. and T.P.S. cable stripped of its sheathing by rats. In some cases the rats had followed the installation along the ceiling joists leaving yards of bare wire. It was agreed that strong recommendation should be made to New Zealand manufacturers and suppliers of T.R.S. and T.P.S. cable to include in the rubber or plastic sheathing some material which would act as a repellant to rodents.

Exide in S.A.

A new factory for the production of electrical storage batteries is to be set up in the near future at East London, South Africa, it has been disclosed at a meeting of the City Council. A site of over 4,400 acres has already been purchased in East London by Chloride Electrical Storage Co. S.A. (Pty.), Ltd., makers of Exide batteries. A director of the English parent company and the manager of the South African enterprise visited East London last month, it is stated. The decision to establish a factory in the Union has been taken in view of South Africa's import controls. The new plant, which will cost about £60,000 is expected to be in operation in 18 months' time.

Cape Town Problem

In 1957 the city of Cape Town's existing "pooling" agreement with the Electricity Supply Commission of South Africa will expire. Last month, the City Council, therefore, directed the Electricity and Waterworks Committee to take immediate steps to enable the Council to determine its future policy for the supply of electricity. The Committee is to open negotiations with the Commission for extending the pooling agreement, and if this fails, to make a recommendation to the Council concerning the establishment of a new power station to meet the demands for current by the consumers of the future. It will be recalled that about two years ago, after a heated debate in the City Council, the Electricity Supply Commission withdrew a written offer to extend the pooling agreement for another 25 years. The matter then lapsed. The main point of difference between the Council and the Commission concerned the managership of the "pooled" stations—a position always held by the city electrical engineer. The Commission suggested that this position should alternate; that when Mr. H. A. Eastman, formerly city electrical engineer, retired, the Commission should nominate a manager and the Council would nominate his deputy; this arrangement being alternated as the managers retired. The present city engineer, Mr. C. G. Downie and his predecessor, Mr. Eastman have both intimated to the Council that it was not their wish to stand in the way of any extension of the pooling agreement, acknowledging the benefit of the scheme, which saves Cape Town about £100,000 a year.

The present power position is that Cape Town's new Table Bay station will reach its maximum generating capacity in two or three years, by which time the Commission's new Salt River "B" station will be well advanced. The Salt River site is also capable of accommodating a third station and already there is talk of the Commission building a Salt River "C".

PERSONALITIES

IN THE INDUSTRY

Deputy managing director of the Sloan Electrical Co. Ltd., **Mr. W. J. Bensley**, has been elected President of the Electrical Wholesalers Federation and chairman of the Council for the ensuing year. He joined Sloan's in 1907 and has risen successively to be Accessories Department manager, London manager, sales manager, and general manager, and in 1947 joined the board of the company as deputy managing director. He is keenly interested in the social activities of the company, having been a vice-president since the inception of the social club. On the E.W.F. he has been a section councillor of the London and Eastern Section of the Federation since 1946.

Mr. W. J. Bensley

Sir Joseph Napier has been elected a director of Philips Electrical Ltd.

Mr. C. I. Orr-Ewing has been appointed a director of A. C. Cossor, Ltd.

Mr. R. E. Dymond has been appointed technical director to Electropower Gears Ltd. and is responsible for design and development.

Mr. R. F. Wilson has joined Thorn Electrical Industries Ltd. as lighting representative for the Cardiff area. He was previously sales engineer for Liverpool Cables' North East area, and from 1948, sales engineer for Mersey Cables, South Wales Area.

Mr. G. Sewell, A.M.I.Mech.E., chief mechanical engineer of Hopkinsons Ltd., has been appointed to the board of directors.

Nominated as sub-area manager (designate) at Taunton (No. 2 sub-area) of the South Western Electricity Board, as from April 1, as we briefly reported last week, is **Mr. E. A. Newburn,** M.I.E.E., who was previously deputy manager, engineering, in that Board's No. 1 sub-area. He will, in due course, succeed **Mr. L. V. Turner,** M.I.E.E., who is shortly to retire. In addition, **Mr. P. M. Wilson,** A.M.I.E.E., who was previously the Board's deputy chief engineer, is to succeed Mr. Newburn as deputy sub-area manager, engineering, No. 1 sub-area (Bristol). Mr. Newburn has recently completed 38 years' service in the supply industry, and prior to vesting date was city electrical engineer of Bath. He began his career with the Doncaster undertaking, going to Rotherham in 1916 and Rochdale in 1921 before taking up the post of chief technical assistant at Walsall in 1930. He was promoted to chief engineer and manager there in 1934, holding that position till going to Bath in 1946. Mr. Wilson, a native of Scotland, gained early experience at Edinburgh before transferring to Bristol Corporation Electricity Department in 1925 as mains engineer, a position he held until vesting day, after which he became the Board's distribution engineer (planning and development). Mr. Turner has been at Taunton for very many years. He, in fact, gained early training with Newtons, Ltd., whose works were at that time in that town. After a spell with the Corporation undertaking, and at Croydon, and with Vickers, Ltd., he rejoined the Taunton Electricity Department as mains engineer, becoming deputy electrical engineer in January, 1931, and, on the death of Mr. A. J. Howard in 1935, took over as borough electrical engineer. It is not generally known that he patented the "Superspeed" transformer operated boiling plate which was adopted by Revo Electric Co., Ltd.

Mr. C. H. Foster, who for the past five years has been engaged exclusively in technical press advertising for the General Electric Co., Ltd., has joined the newly formed agency, Marshall Green, Ltd., to handle their technical accounts. Prior to being with the G.E.C., Mr. Foster was on the technical staff of Standard Telephones and Cables Ltd.

Dr. M. Reed, M.I.E.E., who joined Philips three years ago as chief engineer of Mitcham Works Ltd., has now been appointed a director of that company.

Mr. E. A. Newburn

Mr. P. M. Wilson

Mr. L. V. Turner

Our accompanying photograph was taken on the occasion of the recent visit of **Mr. William Fraser,** M.I.E.E., governing chairman of Scottish Cables Ltd., to the Pietermaritzburg factory of the Scottish Cables (South Africa) Ltd. Mr. Fraser is seen with members of the staff of the South African cable works.

Mr. William Fraser with staff from the Cable Works

We understand that **Mr. A. B. Hitch,** A.M.I.Mech.E., has been appointed to the staff of Brookhirst-Igranic (S.A.) Pty., Ltd., the newly-formed company which will promote the interests of Brookhirst Switchgear Ltd., and the Igranic Electric Co., Ltd., in South Africa. Mr. Hitch, who had been at the Brookhirst London office for several years, left for Johannesburg last month.

After 33 years' service, **Mr. W. Yorke,** M.I. Mech.E., M.I.E.E., is retiring from the position of chief engineer to British Celanese Ltd. In his younger days Mr. Yorke was associated with London Underground during the electrification of the old District Railway and the construction of Lots Road generating station. Later he held appointments with the Manchester Corporation and the County Borough of Sunderland under the late Sir Leonard Pearce and the late Mr. A. S. Blackman respectively. After a brief holiday Mr. Yorke will take up consultative work.

Mr. Lachlan J. Forbes, associate director of Oliver J. Nilsen (Aust.) Ltd., Melbourne, and **Mr. S. F. Penwarden,** production manager, Nilsen Cromie Pty. Ltd., Collingwood, Victoria, (a Nilsen subsidiary), are visiting Great Britain we understand, to investigate the position in regard to new materials, and also study production methods in the electrical industry. Mr. Forbes, by the way, is manufacturers' representative on the electrical approvals standards committee of the Standards Association of Australia, and is also a member of the electrical approvals board of the State Electricity Commission of Victoria. Both Mr. Forbes and Mr. Penwarden will spend about five weeks in this country. Contact with them may be effected through the E.S. & A. Bank, Gracechurch Street, London, E.C.

Mr. L. J. Forbes

Mr. S. F. Penwarden

At last week's meeting, three new directors were elected to the Board of John Inglis Co., of Toronto (in which a controlling interest was recently purchased by the English Electric Co., Ltd.). They are: **Dr. T. H. Hogg,** for many years chief hydraulic engineer of the Hydro-Electric Power Commission of Ontario; **Mr. W. R. McLachlan,** who has been associated with the company in an executive capacity since 1938; and **Mr. H. B. Style,** who, from 1940 to 1945, was a director of the Brazilian Traction Light and Power Co., Ltd. and is well known in Canadian engineering circles.

Due to arrive in this country by air from Australia within the next few days is **Mr. R. L. Karnaghan,** manager of J. R. Hall and Co., machinery merchants, of Melbourne. He is interested in the importation of alternator sets, domestic and industrial hot water services, refrigerators and other household electrical equipment and various woodworking machinery. British concerns interested may contact him c/o C. O. White and Co., Ltd., 7-8 Idol Lane, London, E.C.3.

Manager of the Leeds Branch of the Simplex Electric Co. Ltd. since January 1924, **Mr. R. Charles** retired from that position last week end. He is succeeded by **Mr. I. M. Cameron** who has been deputy manager of the Leeds branch.

We hear that **Mr. C. H. Noton,** general sales manager of Fibreglass Ltd., has now joined the board of that concern as a director — a recognition of his usefulness to the firm and to its customers, for during the last few years he has made an important contribution to the general progress of the company in its development of applications of Fibreglass insulation. He will of course continue to be responsible for sales.

Mr. C. H. Noton

D

Extending their T.V. development organisation, E. K. Cole Ltd. has appointed **Mr. Alan Godfrey,** who, working in conjunction with local Ekco representatives, will be responsible for the areas covered by the Holme Moss and Kirk O'Shotts transmitters. Since 1948 he has been with Ultra Electric Ltd. as television sales promotion manager. He will be based initially on the Ekco northern depot at 55 Whitworth Street, Manchester.

Mr. A. Godfrey

Mr. S. N. Duguid, J.P. B.SC. Tech., F.Inst.F., F.R.San.I., has joined the staff of Powell Duffryn Technical Services Ltd., and has taken charge of their branch office at 26, Corporation Street, Manchester 4. Mr. Duguid is *inter alia* chairman of the City and Guilds' Advisory Committee on Boiler House Practice.

In regard to **Mr. A. G. E. Briggs,** who has been released to serve as deputy controller of supplies (munitions) production, Ministry of Supply, we are asked to make it clear that he is an assistant managing director of Tube Investments Ltd. and managing director of Simplex Electric Co. Ltd.

C. C. Wakefield and Co., Ltd., announce the following appointments within their Industrial Sales Organisation: **Mr. J. W. MacMahon,** M.Inst.Pet., to be sales manager, Industrial Oils Department; and Messrs. **B. S. Davis, D. S. Kirkpatrick** and **J. E. S. Elwell,** to be Eastern, Western and Northern Regional sales managers respectively.

Our congratulations to **Mr. Douglas Smith,** jnr., director and secretary of Smith's Electric Vehicles Ltd., (pictured here), on his election to associate membership of the Institute of Chartered Accountants. He was articled with Messrs. Price, Waterhouse of Newcastle-upon-Tyne.

Mr. D. Smith, Jnr.

OBITUARY

We learn of the recent death of **Mr. L. Dymore-Brown,** aged 62, who formerly represented Standard Telephones and Cables, Ltd. in France and Switzerland, retiring from that post in 1941.

We note the death, on March 27, of **Mr. A. H. Redfern,** aged 66, for some years the London director of Redfern's Rubber Works, Ltd.

The death occurred recently of **Mr. W. J. Burrows,** aged 60, managing director of Stevenage Electrical Engineering Co., Ltd.

We note the death, on March 26, at Over Hulton, near Bolton, of **Mr. Ormerod Gaskel,** A.M.I.E.E., aged 58, who was for many years a senior maintenance engineer with the old Lancashire Electric Power Co.

WILL.— Sir Geoffrey Clarke, C.S.I., O.B.E., a former managing director of the Telegraph Construction and Maintenance Co., Ltd., etc., left £16,964 (£14,362 net value).

BRITISH STANDARDS

Insulating Oil (low viscosity) for Transformers and Switchgear. *B.S. 148, 1951: Price 6s.* The original edition of this standard was published in 1933 and dealt with six classes of oil, differing in sludge limits and cold test temperatures. Experience has shown that while satisfactory performance in respect of freedom from sludge formation is provided in practice by oils meeting the sludge test limit for Class B oils, it is desirable to exclude oils of this class having a tendency to excessive formation of acidity. Such oils are accordingly excluded from this revision. Further, it is now considered unnecessary to provide a selection of oils having different temperature characteristics, and a maximum pour point of—25° F(—31·7° C) has been standardised as suitable for the majority of conditions.

Gears for Traction. *B.S. 235: 1951. Price 4s.* This new British Standard has been drawn up to replace B.S. 235 which was originally published in 1927 to deal with gear wheels and pinions for electric tramways. In preparing the revision, care has been taken to ensure that gears made to this new standard shall be interchangeable with those manufactured in accordance with the original standard published in 1927. The general lay out of the standard has been brought into line with that adopted for the other British Standards for gears and it includes, in addition to provisions for the marking of the gears and details of the basic rack, two tables setting out the preparations of straight spur gear teeth and helical gear teeth of 7½° spiral angle.

Aluminium and Aluminium Alloy Sections. *B.S. 1161, 1951. Price 5s.* The standard, which was first published in 1944, has now been extended to cover additional sizes of aluminium alloy sections and to include sections made for incorporation in designs and most manufacturers are in a position to supply almost the full range. It may, however, be some time before some of the manufacturers can supply all sizes. Many suppliers are able to make larger sections than those given in the table but it is not yet practicable to standardise these.

NEW LITERATURE

An Introduction to Servomechanisms

by A. Porter, M.SC., PH.D.

THE great advantage of this little book is that it is written, not for the specialist in the theory and design of servomechanisms, but for the physicist and engineer who has a general interest in the subject. With this object in view, the author devotes his space to giving examples of typical servo schemes and to indicating in terms of elementary examples, the theoretical foundations of the subject and the basic problems of servo design.

A readily understandable first chapter introduces closed-sequence control systems, and this is followed by a fairly simple mathematical investigation of the basic equations and of their application to transient and steady state behaviour. Frequency response characteristics and diagrams are dealt with in a long chapter and lag correction and stabilisation receive a similarly thorough treatment. All chapters are provided with a useful bibliography of further reading. Published by Methuen and Co., Ltd., 154 pages, 6½ in. by 4 in. Price 7s. 6d.

Handbook of British Refrigeration Material

EACH year brings changes in the refrigeration industry, both in regard to models in production and new firms who have entered the trade. This rapid growth is strikingly revealed in the 1951 edition of the handbook, which has again been extended. This volume is, as before, sectionalised into machinery, power and plant equipment, insulation and refrigerator construction, and instrumental equipment groups, information concerning many of the products being given. Alphabetical and classified lists of the firms are included for handy reference, which, together with the tables and data applicable to the trade, makes it a very useful compendium. Published by Modern Refrigeration, 300 pages, 9½ in. by 7 in. Price 20s.

New High-Speed Counting Tubes

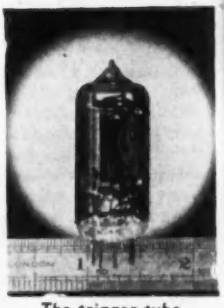
The "Nomotron"

CIRCUIT simplification and higher operating speeds are the features of two new gas discharge tubes developed by Standard Telephones and Cables Ltd., for decade counting.

The ten-point "Nomotron" also known as the G10-240E, counts and stores ten pulses by means of a glow discharge which advances from one to another of ten storage cathodes as each impulse is received. This is ensured by the arrangement of the electrodes, which consist of a common anode around which are arranged the ten storage cathodes and ten internally-connected transfer cathodes. Only a single pair of input terminals is required, one being normally earthed.

Assuming a glow discharge at one of the storage cathodes, the application of a negative pulse to the common transfer cathode terminal causes the transfer gap next to the existing discharge to fire and to extinguish the discharge on the storage cathode. When the pulse is removed, the discharge at the transfer cathode is transferred to the next storage cathode, where it is maintained until the arrival of another pulse. By this means, at each successive pulse the glow discharge is transformed forward one position, discharge being maintained at only one gap at a time. The maximum speed of operation is in excess of 25,000 pulses per second.

The other tube, the G1-370K has been developed as a general-purpose, high speed, high input impedance cold cathode trigger tube and is especially suitable as a driver for the "Nomotron". This tube includes a priming gap across which a very small auxiliary discharge is permanently maintained to overcome "statistical" delay of firing of the trigger gap. The main electrode structure comprises an enclosed main gap which is effectively shielded from external sources of ionisation and from the auxiliary priming discharge so that its firing is completely controlled by the trigger discharge. The trigger gap is so arranged with respect to the main gap that there is no measureable time lag in transfer of discharge from trigger to main gap.



The trigger tube

The trigger tube is designed to operate from the same anode supply (300/350 V), and does not vary in performance, whether dealing with entirely random pulses or with a succession of pulses up to a repetition rate in excess of 100,000 pulses per second.

These two tubes provide the circuit designer with a pair of circuit elements which enable revolutionary advances to be made in counting and similar pulse circuits without loss of efficiency, at working speeds considerably in excess of anything previously possible with gas tubes.

The BUYER'S *Column*

New "Negatron" Fittings

NEW fluorescent fittings for industrial and commercial purposes are announced by NEGATRON LTD. of High Lee Works, Lee Street, Oldham, Lancs, and 93-97 Regent Street, London W.1. Designed for trouble-free service, the units incorporate a quick-start transformer unit and an earthing arrangement included in the fitting, thus obviating the need for conducting strips on the tube itself.

The Negatron fitting in Perspex

Illustrated is a commercial fitting which makes extensive use of "Perspex" and light alloys. Industrial fittings in steel are also obtainable. A range of "Perspex" diffusers or detachable louvres is available for most sizes and types of fittings, which are designed for easy cleaning. Ballast gear in the industrial steel fittings is solidly immersed in bitumen, and it is stated that this construction has been tested by the Ministry of Supply over a period of 18 months. Negatron Ltd. also offer a planned lighting service.

Basic Economics

FROM April 1 "Xcel" thermostatic electric irons, model numbers A2002 and A2003 Chromium plate or cream vitreous enamel finish will be entered in the price lists of ELEXCEL LTD., Broad Green, Liverpool 14, as costing 47s. 6d.

Also announced with effect from April 1 is an increase in the price of the model CF non-pump washing machine made by HOTPOINT ELECTRIC APPLIANCE CO. LTD., Crown House, Aldwych, London W.C.2.

The CF machine with a.c. motor is now £53 plus £13 15s. 7d. purchase tax, whilst the type with d.c. motor costs £55 10s. plus £14 8s. 7d.

A new list has been issued by the NORMAND ELECTRICAL CO. LTD., North Street, Clapham Common, London S.W.4, which gives details of new prices for NECO Products which came into force on March 31. The company points out that this list is in no way a catalogue but simply a list of prices. They add that they have been able to keep over 50% of new prices unchanged despite increases in materials prices. All Neco geared motors remain the same price. Other prices have been kept down by redesigning many of the motors, reducing frame sizes in many cases.

Fourth firm with a revised price list is WEMBLEY ELECTRICAL APPLIANCES LTD., Exhibition Grounds, Wembley Park, Middlesex. This new price list takes effect as from March 27, 1951. Contrary to general trends, certain prices have been *decreased.* This the firm attributes to improved production methods, internal reorganisation, careful costing, and a fixed sales policy.

N.S.F. Co. to make "Ledex" Circuit Selectors

ANNOUNCED recently was the decision of the BRITISH N.S.F. CO. of Keighley, Yorks, to trade in future as N.S.F. Ltd. (National Switch Factory) which we recorded earlier.

Amongst the many activities of the firm is the large-scale production of the famous "Oak" radio switch. After an extensive tooling up programme the company is now producing large quantities of the "Cutler Hammer" appliance switches under licence.

Another development is the decision to manufacture under licence the "Ledex" rotary solenoid and circuit selector. Deliveries of the first two sizes will soon be available.

"Staffa" Grinding Machines

THE new pedestal mounted grinders now being placed on the market by CHAMBERLAIN INDUSTRIES LTD., of Staffa Road, Leyton, London, E.10, are especially designed to ensure rapid metal removal and the utmost economy from the grinding wheels.

These machines are designed in accordance with Home Office regulations, and their sturdy construction ensures trouble-free service and the minimum maintenance. The characteristic toughness of the aluminium oxide abrasive wheels makes the machines suitable for a wide variety of work, and particularly for grinding materials of high tensile strength.

A 10" x 1" Staffa grinder

In each case the symmetrically designed, totally enclosed type body is fabricated entirely from mild steel plate and the maximum strength is obtained by the addition of

bracing, where necessary, to eliminate vibration. Ventilating louvres are provided in the sides of the casing to allow radiation of heat from the motor.

The drive to the spindle from the motor consists of endless rubber Vee-belts running in grooved pulleys.

Direct-on-line push button-operated starter switches are provided in each case, in compliance with Home Office regulations and with the general requirements of BSS 587.

Exhaust hoods are of heavy gauge steel plate with adjustable spark-arresting flaps for wheel wear on the diameter, also complying with Home Office requirements. Hinged side plates allow for easy changing of grinding wheels, and the removal of accumulated heavy swarf.

Suitable snouts are provided at the back of the guards for coupling up to any exhaust system.

There are three models available, a 10 in. x 1 in. (D.4) model powered by ¾ h.p. squirrel-cage motor and operating at 2,850 r.p.m.; the second a 16 in. x 2 in. model powered by a 4 h.p. 1,500 r.p.m. synchronous motor, and a 24 in. x 3 in. unit with a 6 h.p. synchronous motor.

Hot Weather to Come

COMING at an appropriate time when we are beginning to see a change from the wintry weather which has heralded the belated appearance of spring and at a time when people are beginning to think of hot summer days is the publishing by REVO ELECTRIC COMPANY LTD. of Tipton, Staffs, of a new brochure dealing with Revo electric fans.

Revo's "Aermaster"

Many types are available ranging from the 8-in. Aero fan to 60-in. ceiling fans, together with regulators and associated control equipment.

The "Aermaster" models available in 12-in. and 16-in. oscillating and non-oscillating types are typical of the range. Their graceful lines, attractive chocolate brown and cream finish, combined with high efficiency and durability speak loudly in favour of a "Revo" fan for the home or office.

With induction type 4-pole motors for single-phase a.c. supplies these fans are not expensive—the 12-in. non-oscillating model costs £7 10s., whilst relative increases are in force for the larger 16-in. blades, and for the addition of oscillating gear. The 16-in. oscillating model costs £10 5s. 6d.

G.E.C.'s link testing wattmeter

G.E.C.'s Link Testing Wattmeter

THE link-testing wattmeter, introduced by the GENERAL ELECTRIC CO., is an instrument designed to measure the power in a.c. or d.c. circuits without breaking the conductors.

It comprises two main units: (*a*) the links, which are mounted in a bakelite housing, with a handle and operating lever which enables them to be opened and closed over the conductor under test, using only one hand, and (*b*) interchangeable indicators in moulded bakelite cases which can be plugged into the links by the user.

The instrument can be used on circuits up to 300 V and will embrace conductors up to 1¾ in. maximum diameter. Two fuses mounted in a bakelite moulding are fitted in the voltage lead to give protection to the operator and the instrument.

Five standard ranges are available—5, 10, 50, 100 and 200 kW—and two scales are provided for each, a kilowatt scale printed in black and a horse-power scale printed in red.

Current consumption for full-scale deflection of the voltage coil is 16 mA and power consumption is approximately 3·5 watts at 250 V, 50c/s.

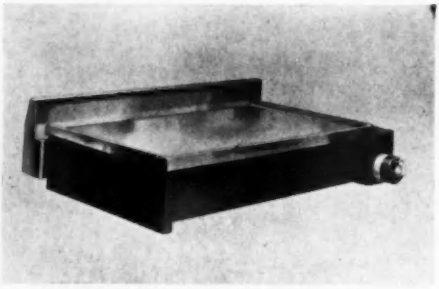
The catalogue price of the links is £6 12s., to which must be added £6 12s. for each wattmeter indicator and £3 3s. for each ammeter indicator. The latter are available in six standard ranges: 5-10, 10-100, 20-200, 40-400, 60-600 and 80-800 amperes.

Cooking on a Griddle Plate

APART from their wide range of first-quality kitchen equipment and domestic appliances which is marketed as a stock line, the ARORA COMPANY of Roseberry Street, Loughborough, Leicestershire, also undertake the manufacture of equipment for special purposes and applications.

Typical of this work is the American style Griddle Plate, a development of the Arora Scone cooking plate, which has been made for the use of the American Forces in this country.

The size of this plate is 30 in x 18 in. It is made from polished cast iron fitted with a removable



Arora's griddle plate for the Americans

aluminium draining tray. Loading is 4·4 kW.

The equipment is particularly useful for large-scale frying and an adaptation is the provision of a pan for frying doughnuts in small quantities.

Erratum

WE regret that in a reference to the new polishing motors by HIGGS MOTORS, LTD., Witton, Birmingham, in our March 1 issue we stated that the machine was suitable for a voltage range of 200/250 V, whereas this should read 200/500 V.

TRADE PUBLICATIONS

MECHANICAL HANDLING. List No. 60. General Purpose received from the Angel Truck Co., Ltd., Albion Road, London N.16, gives details of the many electric, manual and petrol trucks which the firm supply for various jobs.

FUSEGEAR. The "Wylex Armchair," No. 65, a monthly "letter" issued by Geo. H. Scholes and Co., Ltd., Wylex Works, Wythenshawe, Manchester, focuses attention on the "Wylex" extended range of fuse units.

MINING MACHINERY. New brochures issued by the Distington Engineering Co., Ltd., Chapel Bank, Workington, Cumberland, gives details of the coal cutters, shaker conveyors and duckbill loaders and other equipment produced by the company.

REFRIGERATION. Leaflet 2.96, issued by the Pressed Steel Co., Ltd., Cowley, Oxford, describes and illustrates the new "Prestcold" C.C.82 Ice Cream Conservator.

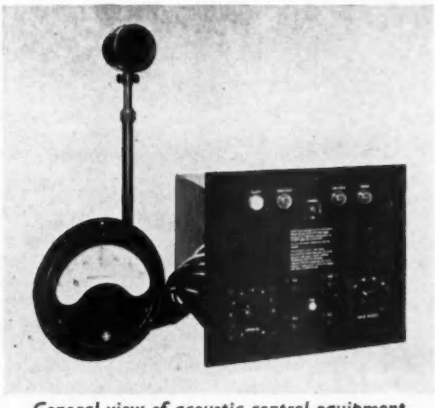
Noise Controls Coal Feed

ACCURATE control of coal feed to a tube mill used for pulverising coal can readily be effected by noting the noise level of the cascading coal and balls in contact with each other and with the walls of the drum. This has a close connection with the amount of coal in the mill, and the skilled operator soon develops a very critical sense of hearing.

Obviously, however, this reliance on a sense which can be upset by so common a trouble as a cold in the head has its disadvantages, and so Standard Telephones and Cables Ltd. have developed a feed controller which determines the actual contents from the noise in a manner analogous to the human ear.

The basic apparatus evolved for this purpose consists of a microphone, which has to be adequately protected against dust and dirt, as it is placed immediately beneath the drum. This is connected by cable to the main controller unit, which is set up at any desired distance from the tube mill. The output stage of the controller unit comprises a series of pads for lining-up purposes, an amplifier and a high-pass filter, the function of which is to segregate the significant high-frequency noises emanating mostly from inside the drum, from the low-frequency noises associated chiefly with the external gearing and drive of the mill itself.

The most significant noise frequencies have been found to exist at about 4 kilocycles. These give a noise discrimination of some 14 decibels between the full and empty condition of the mill, as compared with about 3 decibels which is the best discrimination possible when considering the overall noise frequency spectrum of the mill.



General view of acoustic control equipment

The output from the amplifier-filter stage of the controller is used to actuate a sensitive relay adjusted to operate in accordance with fluctuations in noise above and below a set figure corresponding to the optimum amount of coal in the tube.

THE WEEK

COMMERCE *in news* INDUSTRY

Shops Dark until Summer Time

THE Advertisement Lighting (Prohibition) Order, 1951, which became operative on January 7, is to remain in force until summer-time begins on April 15. Announcing this, the Minister of Fuel and Power said that although coal supplies had greatly improved it was still necessary to practice the utmost economy in order to build up stocks.

It will be remembered that the above Order prohibited the use of electricity, gas, oil and candles for all advertisement purposes, allowing only electricity obtained from windmill generators. It superseded an order made last September which banned the use of electricity during peak hours only.

Price Increases in N. of Scotland

A 10% increase in electricity charges has been made by the N. of Scotland Hydro-Electric Board, it was announced last week. The new prices are to apply to electricity consumed from the first meter reading after March 31. No consumer, however, will be charged a higher average price than 6d. per unit, which is the present maximum. New tariffs introduced at the end of 1948 resulted in a reduction of charges in some areas, and last winter a cheaper rate of ½d. per unit was introduced. Since then, the Board states, there has been a steady rise in the cost of materials and labour required for the generation and distribution of electricity, and goes on to list some of the increases which took place between December 1948 and the present time. Copper wire has gone up 43%, aluminium 42·5% and coal 10%, while wages of manual labour in the electricity supply industry have risen 11%, and in civil engineering works 18·6%. In addition there have been steep rises in the cost of manufactured plant and machinery.

Turkey's Industrial Expansion

UNDERCUTTING by German offers, of the U.K. prices for small electric motors in Turkey is referred to in the latest overseas economic survey published by the Board of Trade. This report deals with the considerable progress made in Turkey in the change from an ancient system to a modern industrialised structure. In this, electricity production has more than doubled in the past ten years, but there remains a serious power shortage. The most modern power station is the coal-burning plant at Catalazzi, which houses British equipment. It has been decided to build a 100 MW hydro-electric station at Sariyar, but this project is still in the early stage Some details are also given of other power projects, many of which have been postponed indefinitely, for the total cost is prohibitive. But the realisation that the country must produce and export to earn foreign exchange should provide increasing opportunities for U.K. importers.

Metal Prices Up Again

A FURTHER rise in the selling prices of copper, lead and zinc, operative from April 2, has been announced by the Ministry of Supply. Electrolytic copper is increased by £8 to £210 per ton; good soft pig lead is raised by £24 to £160 per ton, and good ordinary brand zinc is now £160 per ton—an increase of £9. All prices are based on delivery to buyers' premises. Discounts and premiums and charges for forward delivery, where applicable, remain unaltered. The last rises in the prices of these metals occurred on September 1 for copper, November 1 for lead and October 1 for zinc.

Direct Appeal to Minister Sought

THE prerogative of appealing direct to the Minister of Fuel and Power instead of through the Central Authority was the substance of a motion put to a recent meeting of the Southern Electricity Consultative Council. The Minister is to be asked to consider the amendment of Section 7 of the Electricity Act accordingly. Mr. A. Lockwood, chairman, said that while he agreed with the intentions of the motion he did not think it wise to submit it at the present time. He reminded the Council that there would be a meeting of all Consultative Councils in the near future, and the matter would probably be raised then. The result might be a national body to

The First Half-Century

It may be of interest to state that we have lately been carrying out tests on both 200 and 100 V lamps, and we mention that we have found, taking an average number, that the 200 V lamp of one maker consumed at start 4 W per candle increasing to 4·3 W per candle after 500 hours, whereas the same maker's 100 V lamp consumed 3·5 W per candle at start, increasing to 3·7 W after 500 hours.—The Electrical Testing Laboratories Ltd.—*From our issue of April* 4, 1901.

speak for all councils, which would be more effective than individual approaches.

Mr. E. Sergeant pointed out that a national body might well prove as frustrating as the present arrangements whereby representations had to be made to the Area Board. A copy of the motion will be sent to all Consultative Councils asking them to write to the Minister in support of the proposal.

Supply of Magnesium Controlled

RESPONSIBILITY for the supply and distribution of all magnesium will be taken over by the Ministry of Supply as from May 1. Consumers will be asked to state their consumption and stock as at March 31 and estimate their requirements for April and May. They will also have to make monthly returns. This action has been taken because of short supplies and the importance of magnesium in the rearmament programme.

The Ministry also announced recently that the monthly announcements concerning allocations of copper, lead and zinc, are to be suspended. They will be made in future only when there is any major change in the supply position or administration.

Lighting at the Nets

HAVING gained encouragement from England's two successes in Test matches against Australia and New Zealand, it is a pleasant task to record some valuable assistance contributed by electrical engineers in England's endeavour to gain more cricketing honours. The Essex County Cricket School at Romford has been re-fitted with Ekco fluorescent lighting and the designers were faced with numerous difficulties in these unique circumstances to avoid shadows and to reproduce actual playing conditions. The scheme consisted of 61 Ekco FF17 ceiling batten fittings but the main feature of the installation was the sky-blue canvas screens which were attached to roof trusses to act as giant baffles. These virtually turned the roof into a large louvred ceiling, the result being that the cricketer is unable to see any light source when looking up or down the wicket. Contractors were West and Turner, Ltd.

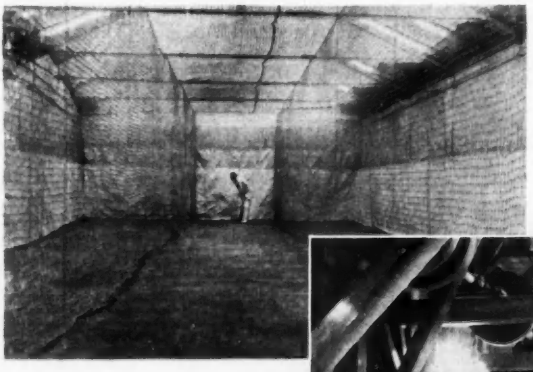
The shadow problem was also apparent in another Ekco installation, in different circumstances, when at Joseph Ranks Solent Mills, engineers were faced with an astonishing amount of machinery reaching from the floor to ceiling. In this instance daylight fluorescent fittings were fitted in rows among the machinery and the problem was successfully overcome as is shown in our accompanying illustration.

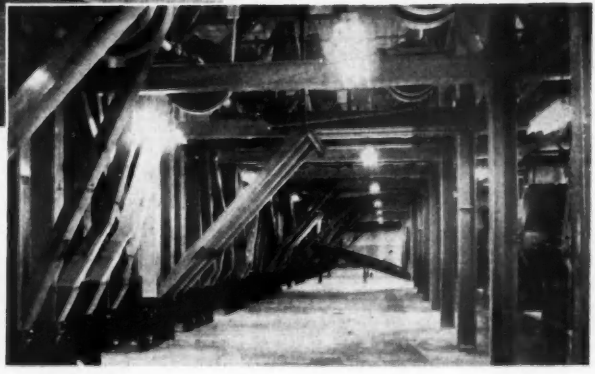
Scrap Prices and Metal Exports

NEW maximum prices for non-ferrous scrap came into force yesterday (Wednesday) under the Non-Ferrous Metals Prices (No. 3) Order made to bring scrap prices into line with the new selling prices of virgin copper, lead and zinc. Re-melted lead goes up to £147, clean bright untinned wire and commutator bar of copper scrap to £198 and cable sheathing to £146. Other increases involving brass scrap are cuttings to £173 and swarf to £153. In view of the scarcity of copper and zinc the Board of Trade has announced that the rate of export of semi-manufactures of copper and its alloys will be limited during April, May and June to about half the rate prevailing in the first six months of 1950. A further announcement is to be made before June 30. The export of semi-manufactures of zinc will be allowed only in exceptional circumstances.

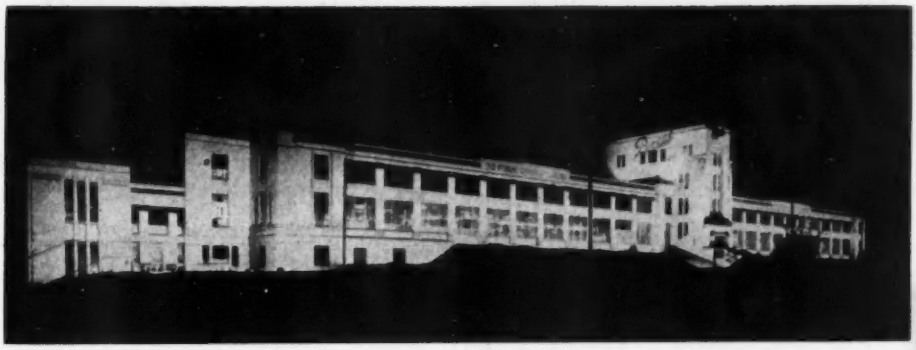
That Ever-present Problem

THE worst of the winter and its effect on fuel supplies is now presumed to be over, but the problem of load shedding is not ended judging from reports





Two contrasting examples of lighting installations in which Ekco fluorescent fittings were used. Both involved long "corridors," but in widely differing circumstances, and ensuing difficulties were successfully overcome in each instance by the company's illuminating engineers



Our photograph shows an attractive example of floodlighting carried out by Falk Stadelmann and Co., Ltd. at the London head office of Pyrene Co., Ltd.

which have reached us from Nottingham. This may be as well because, although further suggestions on methods of economy in electricity will no longer be of use for the 1950-51 winter, the same difficulties will probably recur next year. The outcome of discussions by a local committee of the E. Midlands Consultative Council came before the council at its meeting last week when a scheme was suggested which would cut electricity consumption by 10% at peak periods without jeopardising production.

Hitherto industrial consumers have been asked to make cuts of 10% during peak hours but the committee's plan was that certain factories should cease altogether at these times on various days and make up the lost hours by working an extra 20 minutes on other days. All that was necessary, stated the committee, was to arrange each sub-area into 10 groups, each of equal consumption. On each day of the ten-day fortnight one group would have a six-hour instead of a nine-hour day and during the remaining three hours a tenth less electricity would be consumed. Concerning commercial consumers it was maintained that shop-window and advertisement sign restrictions had little direct effect on peak load problems, and domestic consumers were not extravagant. The Consultative Council received the plan without comment except that it was identified as a pure suggestion which would be forwarded to the National Advisory Council.

Travelling Festival

THE largest "mobile" exhibition to be assembled will be shown in four of Britain's main industrial centres as part of the Festival of Britain. The complete show, consisting of about 5,000 exhibits is to be transported by road and, after its run in one town will be dismantled and loaded on to lorries for despatch to the next centre. One of six sections has been called "Invention, Discovery and Design," and incorporates all the latest developments in lighting. Domestic equipment will also form an important part of this section. The exhibition will be in Manchester between May 5 and 26, travelling to Leeds for the period from June 23 to July 4. The other two stages will be at Birmingham between August 4 and 25 and Nottingham from September 15 to October 6.

Land, Sea and Air

SEVERAL installations of transmitting equipment have been reported from Marconi's Chelmsford factory recently. An important order fulfilled in the past few weeks was for two 5 kW medium frequency transmitters for the South African Broadcasting Corporation who have been engaged for some time now on enlarging and improving their service. This order brought the total number supplied to Union Authorities to eight. Two have been installed at Grahamstown and three at Pietermaritzburg, and a sixth, destined for Grahamstown, is now under construction. The present order will be installed at Maraisburg and Welgedacht.

At home a new high-powered transmitter and mast radiator will shortly be in service at Daventry for the B.B.C. The installation consists of two complete transmitters of 100 kW output, arranged in line with a special paralleling unit between them. Maintaining their association with the sea, Marconi have also been busy aboard the *Ocean Monarch*. The short-wave radio-telephony transmitting and receiving equipment provides passengers with direct communication with their homes and offices at any point on the liner's New York-Bermuda run.

Rists' New Venture

WE understand that Rists' Wires and Cables Ltd., of Newcastle-under-Lyme, are contemplating the manufacture of fluorescent lamps. Considerable interest in the project was shown by the managing director, Mr. D. A. V. Rist, when members of the Stoke-on-Trent Engineers' Association visited the factory recently. Not long ago, the firm undertook the manufacture of glass tubing, and a second furnace was being installed for the purpose, it was stated.

A close-up view of a row of shelves showing the effective use of fluorescent lighting in Torbock's Self-Service Store at Eastleigh

Scottish Boards Censured

INCREASED charges being made by some Electricity Boards for the installation of electricity in municipal houses will be the subject of a motion by Provost H. J. Milne at the two-day meeting of the Convention of Royal Burghs in Edinburgh next month. The motion reads that: "representations be made to the appropriate Government Department against the present policy of certain of the Electricity Boards in Scotland concerning the increased charges being made by these boards for electricity installation in new municipal housing."

"Industries" Jubilee

IT is indeed a pleasant task this week to extend our sincere good wishes to *Electrical Industries* who this month celebrate their golden jubilee. On this memorable occasion we would like to echo the congratulatory remarks expressed by Lord Citrine, published in the journal's current issue. Also contained in the jubilee number are special articles on the first municipal undertaking, facts and figures of electricity supply and a review of electrical progress since 1901 when the magazine first appeared under the title of *Electrical Industries and Investments.*

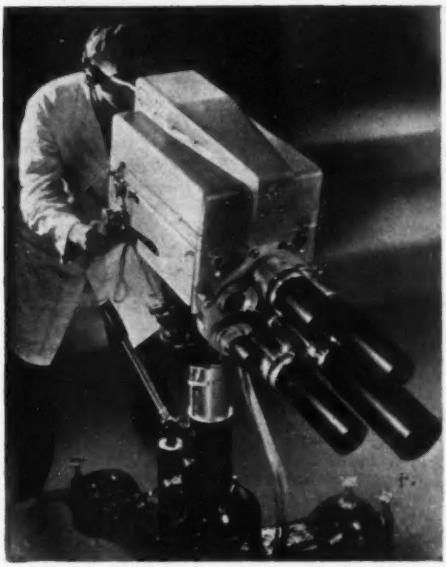
Self-service Stores

SELF-SERVICE stores have become increasingly popular in America since the war and although this new method of shopping has not developed to such a large extent in this country its advent has been conspicuous. With row upon row of merchandise displayed, no lighting fitting is more appropriate than the fluorescent tube and we take the opportunity this week of featuring the Torbock Self-Service Store at Eastleigh to illustrate the effectiveness of this type of lighting. Fredk. Sage and Co., Ltd., the shopfitters, who were responsible for the shop's layout, have adopted fluorescent lamps for the Sageway standard illuminated cornices. Osram lamps and gear have been used exclusively in these cornices. Prices are shown in black on white enamelled strips placed at an angle along the front of the shelves so as to pick up the light from lamps in the cornice at the top.

Lighting in Macclesfield

THE main road between Stockport and the Potteries was the scene of a large lighting installation carried out last month by the N.W. Electricity Board. The scheme involved a transformation from gas to electricity and covered a three-mile stretch of road running through Macclesfield. Both fluorescent and sodium lighting was used, the former being confined to the town's main shopping centre and sodium lighting to the approaches. The fluorescent lamps each consisted of three 5 ft 80 W tubes mounted on 29 steel columns, while 120 concrete columns carried 140 W sodium discharge lamps. Value of the contract was £9,472 and was completed in six weeks.

Our picture shows the new fluorescent lighting near Macclesfield Town Hall which formed part of the £9,472 contract carried out last month by the North Western Electricity Board



One of the many examples of Britain's achievements to be shown at the Festival is this six-lens television camera manufactured by Emitron Television Ltd.

Electricity in Schools

THE county architect in Northumberland has completed an investigation into the artificial lighting of schools. He states that out of 239 separate buildings, at the completion of the present year's programme, there will remain 12 schools where electricity was reasonably available and where the building was not supplied with either gas or electricity. Five of these 12 schools were however to be closed. In the case of 28 schools lit by gas, electricity was available for 24, eleven of which will be closed shortly. The report added that the cost of supplying electricity to schools where supplies were reasonably available was £8,460.

When Load is Shed

OUR attention has been drawn to an error occurring in the article under the above heading, which appeared in our issue of March 15. In the reference to centrifugal switches on single phase motors, the words "open" and "close" were inadvertantly transposed.

New TV Transmission Equipment

EMITRON Television Ltd. have recently introduced a new type of television equipment, an outstanding feature of which is the six-lens C.P.S. camera. Some of the salient features of the new camera are the electronic view-finders which have a 6½ in. white screen aluminised viewing tube facilitating ease of operation, and the arrangement of the lens turret so that lenses not in use are below the level of the camera top and do not obstruct the operator's view. The lenses are accommodated in interchangeable mounts which provide a wide and flexible range of viewing angles. The equipment has been designed to fulfil the exacting requirements of both producer and operator, and will be seen for the first time at the Festival of Britain.

News in Brief

The E.P.E.A. Southern Meter Engineers' Technical Group will be holding their annual dinner this year at the Palmerston Restaurant E.C.2, on April 20. Tickets can be obtained from L. W. Russell, 26 Merrivale Avenue, Ilford.

Domestic dishwashing machines have been added to the list of goods which may be imported without individual licence from the usual "liberalisation" list of soft currencies.

Thomas De La Rue and Co., Ltd. will be holding a private exhibition of their products at the galleries of the Royal Society of Painters in Water Colours, Conduit Street, W.1, from July 2 to 19. Admission will be by invitation.

H.M. Customs and Excise have agreed that food mixers designed for commercial or industrial use and having a capacity of over six imperial quarts will not, in future, be chargeable with purchase tax provided they are not advertised as suitable for domestic use.

Large-scale developments are in progress at Hoover Ltd's Merthyr Tydfil works. The new extension to the washing machine factory is expected to be in production by early May and it is hoped to build further extensions which will treble the size of the original factory.

The British Welding Research Association is to hold its summer school on "Welding Design and Engineering" at Ashorne Hill, near Leamington Spa from May 25 to June 2. Applications to attend should be addressed to the association's secretary at 29 Park Crescent, W.1.

A comprehensive history of the Electrical Fair Trading Policy has just been published by the E.F.T. Council. Copies of the 8-page booklet are available gratis to those in the industry on application to the Council's offices.

Under a new order, the Sulphuric Acid (prices) Order, 1951, the B.o.T. are permitting increases in the maximum prices of sulphuric acid. The additions, coming into effect on Monday next, are 26s. 6d. per ton on weak acid and 33s. 9d. per ton on strong acid.

Electric Supply News

Derbyshire

On a suggestion from the Long Eaton U.D.C., the Derbyshire Urban Council's Association has appointed a sub-committee to approach authorities in Nottinghamshire, Lincolnshire and Leicestershire, with a view to evolving uniform conditions for the supply of gas and electricity by the East Midlands Gas and Electricity Boards to local authorities. It was stated that the time was appropriate for the matter to be considered, because agreements between the Electricity Board and local authorities were being revised, or new agreements made.

Doncaster

First steelwork in the building of the new generating station at Crimpsall Ings, half a mile outside Doncaster, is to be erected this month. Already one-third of the concrete floor area is complete. Initially, two 30 MW turbo-alternators are planned for operation by 1953. Pile-drivers are now driving in the 50 ft long reinforced concrete piles, about 4,000 of which will be needed.

North of Scotland

The North of Scotland Hydro-Electric Board's Kilmelfort scheme (Constructional Scheme No. 61), published this week, will add 9,000,000 units of electricity annually to the power available in Western Argyll. The scheme will utilise a catchment area of 11 sq. miles with an annual rainfall of approximately 74 in. Loch na Sreinge will be impounded by a small dam at its northern end. An aqueduct will lead the water from the loch into a stream which feeds into Lochan a'Bhailis and Loch Tralaig. Loch Tralaig itself will be impounded by a dam on the River Oude near the outlet of the loch to provide the main storage reservoir of the scheme with a capacity of 133 million cu. ft. Water from Loch Tralaig will be released down the River Oude to a small headpond to be formed in the Pass of Melfort by a dam across the River Oude. The Eas Tarsiunn burn will be tapped and some of its water taken by aqueduct direct to this headpond. From the headpond, the water will be led by tunnel and pipeline to a generating station on the left-hand bank of the River Oude near its outlet into Loch Melfort. This station will contain one 3,000 kW turbo-alternator operating under a gross head of 365 ft.

Northumberland

Work is expected to commence shortly on the erection of the 275 kV grid line in this county. Preparatory work being almost complete, a meeting was held yesterday, April 4, between representatives of the North Eastern Division of the B.E.A. and the National Parks Committee of the Northumberland County Council, and the county planning officer, to decide on the siting of the pylons in the area.

North Wales

When Caernarvonshire Planning Committee considered Sir Patrick Abercrombie's report on the North Wales hydro-electric schemes on Monday, a letter from Mr. A. R. Cooper, divisional controller of the B.E.A., was presented. In this, Mr. Cooper, after paying tribute to Sir Patrick's endeavour to deal fairly with the problem, added that certain technical inaccuracies had crept into the report which ought to be corrected.

Raising the load factor on the new station at Connah's Quay would not provide substitution in any way for the units which would otherwise be generated by the hydro schemes. Any increase in the load factor at Connah's Quay would only be obtained by running the plant late at night or early in the morning during times when the hydro stations would in any case be shut down. Capital spent on distribution schemes did not produce electricity and it would obviously be unsound to reduce the generation of electricity to provide means for greater distribution, he stressed.

Orkney

The new power station of the North of Scotland Hydro-Electric Board at Kirkwall is to be officially inaugurated on May 15. The station houses three 1,000 kW diesel sets.

LIGHTING SCHEMES

Alton (Hants).—The M.o.T. has now approved the U.D.C.'s proposals for electric street lighting which it had earlier rejected. Cost of the scheme is estimated at £16,177.

Anstruther.—The Ministry of Transport has rejected a £2,226 scheme prepared by Anstruther Lighting Committee for the conversion of the street lighting in the burgh from gas to electricity. The scheme put forward involved the use of 18-ft. standards. The Ministry has invited the T.C. to submit alternative proposals.

Boldon.—U.D.C. has received sanction to borrow £6,750 for improved street lighting.

Goole.—The T.C. has approved schemes for electric lighting on Airmyn Road and Rawcliffe Road (at a cost of £1,390), in Boothferry Road (at a cost of £1,885) and in Pasture Road and Westfield Avenue (at a cost of £1,714).

Jarrow.—T.C. has received sanction to provide 38 street lighting units on the Bilton Hall Estate, at a cost of £1,245, and 57 units on the South Leam Lane Estate, costing £2,034.

Llandudno.—Proposals for lighting by electricity, streets now lit by gas, are to be considered by the Public Lighting Committee.

Lockerbie.—The T.C. has approved a scheme for electric lighting in Townhead Street, High Street and Main Street, at a cost of £4,000.

March, Isle of Ely.—The U.D.C. has approved a scheme for improved lighting in the main thoroughfare.

Company Activities

British Aluminium Co., Ltd.

Group trading profits for 1950 were £2,089,259, an increase of £550,900, after allowing £75,000 in respect of a revision in the basis of stock valuation. It is proposed to maintain the dividend for 1950 on the £3,000,000 of old Ordinary stock at 10%, with a final payment of 6%. There is also a final dividend of 3% on the £2,000,000 of new Ordinary stock which was issued during the year. Total group income amounted to £2,112,771 as compared with £1,803,595 for 1949. Depreciation absorbs £479,492 (*£390,459*), debenture interest £150,000 (*same*), and £100,000 (*£200,000*) is placed to reserve for increased cost of plant replacements. Taxation takes £720,547 (*£478,262*), leaving a combined net profit of £608,734 (*£551,203*), of which £604,896 (*£548,560*) is attributable to the parent company. To general reserve £133,400 (*£125,000*), development expenditure £40,000 (*nil*), tax equalisation £101,000 (*£145,000*), and dividends absorb £247,500 (*£214,500*), leaving £806,849 (*£733,543*) carried forward.

A. C. Cossor, Ltd.

The directors announce that preliminary figures indicate that the profits for the year to March 31 will be sufficient, after providing for taxation (at present rates), to recover the deficiency brought forward from previous years and, in addition, to provide for payment of one year's dividend arrears on the 6% Preference stock. The debit balance carried forward at March 31, 1950, was £115,039.

Superheater Co., Ltd.

For 1950 the profit amounted to £178,509, as against £163,301 for 1949, after charging £201,912 (*£182,463*) to taxation. The sum of £50,000 (*£97,448*) is transferred to general reserve, £15,000 (*£3,700*) to research and development reserve, and £11,147 (*nil*) to assets replacement reserve. There is a final dividend on the Ordinary and "A" Ordinary of 17½%, on capital which was increased by a 50% bonus, making 32½%, leaving £57,938 (*£42,926*) carried forward.

Thorn and Hoddle

For the year to September 30 last, the net profit amounted to £1,590 (*£1,713*) plus E.P.T. refund of £208 (*nil*), and after charging £1,636 (*£2,087*) to taxation, etc. The sum of £1,000 has been written off goodwill. The ordinary dividend of 10% takes £550 (*same*), leaving £6,828 (*£6,975*) carried forward.

Richardsons, Westgarth and Co.

Acceptances have been received for approximately 94% of the offer to stockholders of 1,061,616 5s. Ordinary shares at 8s. 3d. each.

R. B. Pullin and Co.

Consolidated trading profit for the year to September 30 last, was £40,039 (*£39,420*), after charging depreciation, emoluments and interest £18,135 (*£21,423*). With sundry credits of £4,077, the profit is £44,116 (*£78,957*).

Wolf Electric Tools (Holdings) Ltd.

Dealings are expected to start today, Thursday, in the 7% Cumulative Preference shares of £1, and 5s. Ordinary shares, details of which were published on Monday. The Preference shares will probably open around 27s., and the Ordinary, if obtainable, at about 6s. 3d. The directors are of the opinion that profits for 1951 will not be less than the average for the last three years (£179,605). This would be sufficient to cover the Preference dividend more than 30 times, and if realised, the directors will recommend a dividend of not less than 7½% per annum for the first accounting period.

Dividends Declared

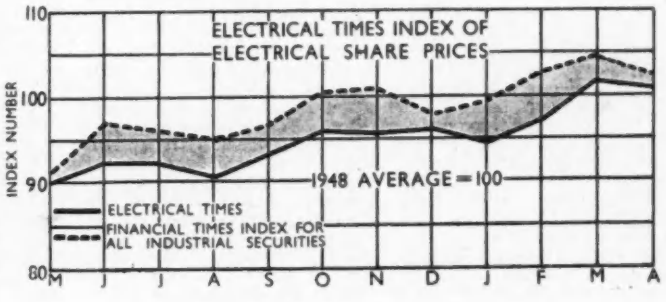
Falk Stadelmann and Co. Interim dividend of 10% (*same*), payable on April 9.

W. N. Froy and Sons. Dividend of 10% (*same*). Profit for 1950 was £73,878 (*£77,561*).

Kerry's (Gt. Britain) Ltd. Final dividend of 11½% making 15% (*12½%*).

Waygood-Otis Ltd. Final dividend of 15% (*same*), making 45% (*35%*). Consolidated profit, including income from investments and after depreciation, etc., is £446,457 (*£338,248*).

Although electrical share prices fell slightly during March both figures remained above the hundred. By the end of the month the "Electrical Times" figure was 101.2, a fall of 1.3. The "Financial Times" index for all industrial Ordinary shares fell from 104.3 to 102.4. These figures are based on the average prices ruling during 1948



Commercial Information

CONTRACTS OPEN

HOME

April 7.—Ashton-in-Makerfield U.D.C. Electrical installation in 50 houses on Landgate site. Surveyor's Office, Town Hall.

April 7.—Bradford. Supply and delivery of following plant for sewage disposal works. Sludge pumping set including electric motor and control gear; fume extraction plant with electrically driven fan; sludge screening plant complete with belt conveyor, electric motors and control gear; and a petrol or diesel driven mobile crane. Sewage Works Engineer and Manager, Esholt Hall, nr. Shipley.

April 7.—Hyde T.C. Supply and erection of 156 Class A street lighting units including columns, lanterns, lamps and starter gear, along A57. Lighting will comprise sodium, fluorescent and mercury vapour lamps. Borough Engineer, Municipal Bldgs., Greenfield St.

April 7.—Twickenham. Supply of 4 electrically driven vehicles for pig food collection. Borough Engineer, Municipal Offices.

April 9.—Glasgow. Supply of electric cables for year beginning June 1 required by Office of Public Works (Room 81), City Chambers.

April 10.—Dublin. Commissioners of Public Works invite tenders for electrical works and supplies required for building in and around the city for one year from May 2. J. Tyrell, secretary, Office of Public Works, Dublin. Deposit £1.

April 11.—Chadderton U.D.C. Supply and erection of 70 street lighting columns, supply of 70 lanterns and auxiliary equipment, mainly group A, and supply of 54 columns, lanterns and auxiliary equipment, group B. Engineer and Surveyor, Town Hall. (See March 29 issue.)

April 11.—Dublin. Supply of 2,000 fuse boxes for mounting on street lighting brackets. City Engineer, 28 Castle St.

April 11.—Ramsbottom U.D.C. Supply and erection of equipment for installation of 140W sodium lighting along trunk road A56 and Class 1 road A676. Borough Engineer and Surveyor, Council Offices. Deposit £2 2s.

April 11.—Swaffham (Norfolk) U.D.C. Wiring of 25 houses. Council Office, Shirehall, Swaffham.

April 12.—Belfast. Supply of flexible metallic tubing (bronze or copper). Gas Works, Ormean Rd., Belfast.

April 12.—Glasgow. Lighting dept. requires electrical fittings and accessories for one year from June 1. Office of Lighting Dept., 20 Trongate.

April 12.—Manchester. Electrical installation at police garage and transport H.Q., St. Joseph's Bldgs., Longsight. City Architect, Town Hall. Deposit £1 1s. (See March 22 issue.)

April 13.—Golborne U.D.C. Supply and erection of Group A sodium lighting along approx. ¼ mile of the Liverpool-East Lancs. Rd. (A580) at Lowton. J. B. Hoyle, Engineer and Surveyor, Council Offices, Lowton, Nr. Warrington.

April 14.—Bideford T.C. Supply and erection of columns and lanterns for 41-point 250 W mercury vapour lighting in Group A on trunk road A41. Borough Surveyor's Office, Town Hall. Deposit £2 2s.

April 16.—Saltcoats. Lighting of trunk road A78 within burgh by mercury discharge lamps, Burgh Surveyor's Office, Kyleshill, Saltcoats.

April 19.—Manchester. Electrical installation at Newall Green Secondary school. City Architect, Town Hall. Deposit £1 1s. (See March 22 issue.)

April 23.—Arnold (Notts) U.D.C. Supply and erection of 89 140 W sodium lamps on concrete columns along Mansfield Rd. (A.60). Engineer and Surveyor, Council Offices, Arnot Hill Park. Deposit £2 2s.

April 23.—Birmingham. Supply and erection of 8 electric lifts at Duddeston and Nechells flats. Herbert J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham 1. Deposit £2 2s.

April 23.—Musselburgh T.C. Electrical work in erection of 24 houses. Burgh Surveyor, Municipal Offices, High St.

April 23.—Southgate T.C. Supply and erection of electrically operated petrol pump with clock-type indicator. J. T. W. Peat, Borough Engineer and Surveyor, Town Hall, Palmers Green, N.13.

April 24.—Wortley R.D.C. Installation of wiring and fittings in 65 houses—first instalment of a scheme involving 1,300 houses. Surveyor to the Council, Council Offices, Grenoside, Sheffield, Deposit £2 2s. (See March 29 issue.)

April 27.—Belfast. Supply and installation of 33 kV and 6·6 kV cables and accessories for City Electricity Dept. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (Advertised in this issue.)

May 1.—Barrowford (Lancs). U.D.C. Electrical work in 12 houses on Higher Causeway estate. Engineer and Surveyor, Council Offices. Deposit £1 1s.

May 1.—Spalding (Lincs) U.D.C. Supply and erection of 61 140 W sodium vapour and 23 3 ft. 80 W fluorescent lamps along trunk road A16. Also of 21 3 ft. 80 W fluorescent lamps on other roads in town. Raymond W. Hastings, Clerk to the Council, 11 Market Place, Spalding. (Advertised in this issue.)

No date stated.—Bridge of Allan. Electrical work in 23 dwellings on Blackdub site and at Stanley Drive. Wilson and Wilson, architects, 39 Vicar St., Falkirk.

No date stated.—Midlothian. Electrical Work in 8 houses at West Calder. County Architect. 32 Palmerston Place, Edinburgh 12.

No date stated.—N. of Scotland H.E.Bd.—Supply and erection of 13 miles of 33 kV and 5 miles of 11 kV and lower voltage s.c. wood pole o.h. lines in Alexandria-Drymen-Kepculloch area. Apply to Merz and McLellan, 39 Northumberland Street, Edinburgh. Deposit £1 1s. (See March 29 issue.)

No date stated.—Newcastle-on-Tyne. Electrical installations in 347 dwellings and 20 shops on various estates. Applications to City Architect, 18 Cloth Market, Newcastle-on-Tyne.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

April 9.—Egypt. Cairo Electricity and Gas Administration

invite tenders for 20 transformers with continuous output of 100 kVA and 20 with output of 125 kVA. B.o.T. (Ref. CRE (IB) 56840/51)*.

April 19.—Sydney. Manufacture, testing, supply and erection of 5,000 V metal-clad oil immersed duplicate busbar switchgear with rupturing capacity rating of 250 MVA and comprising 23 switching units in two groups for Darlinghurst substation. Documents at Sydney C.C's agents, Messrs. Preece, Cardew and Rider, 8-10 Queen Anne's Gate, S.W.1.

April 27.—Uruguay. Supply of six transformers of 75 kVA and three of 400 kVA required by Administracion National de Combustibles, Alcohol y Portland. B.o.T. (Ref. CRE (IB) 56825)51*

April 30.—South Africa. Municipality of Brandfort, Electricity Dept., invites tenders for (a) E.H.T., H.R.C. electrical switchgear, (b) E.H.T. cable and terminal boxes, (c) overhead line material, (d) 2·2 kV oil circuit breakers, (e) an automatic tail-end step voltage regulator. Separate contracts. Details from Town Clerk, P.O. Box 13, Brandfort.

May 2.—Buenos Aires. Supply of electric pumps for deep wells, l.t. boards and Venturi type meters. Secretaria General Administrativa, Ministry of Public Works Sanitary Section.

May 2.—Uruguay. Supply of a battery of accumulators for Administracion General de las Usinas Electricas y los Telefonos del Estado, Montevideo. B.o.T. (Ref. CRE (IB) 56578/51).*

May 8.—Wellington (N.Z.) Supply of one 80-ton, 4-motor, electric, overhead travelling crane for Islington sub-station. Secretary, State Hydro-Electric Dept., Wellington.

May 15.—Persia. Iranian State Railways require 2,000 electric radiators. Works Dept., Iranian State Railways, Tehran Station, Tehran. B.o.T. (Ref. CRE (IB) 57078/51).*

May 16.—Johannesburg. Supply and installation of (*a*) two crude oil engines and alternators 400/231 V, with capacity of 40 kW each; (*b*) a four-panelled cubicle switchboard; (*c*) distribution system covering some 5 tons of copper cable and wire, approx. 130 poles and consumers' connections; (*d*) light and power installations. Town Clerk, Municipal Offices, Karasburg, S.W. Africa.

June 13.—Queensland. Supply, erection and testing of six 66-kV circuit breakers at Townsville Regional Electricity Board's power station and substations at Townsville, Ayr and Home Hill for State Electricity Commission. B.o.T. (Ref.: CRE (IB) 56696/51).*

June 29.—Uruguay. Tenders invited for 250 trolley-buses, rectifier stations, underground cables, overhead line equipment, steel poles, grooved copperwire and flexible cables. B.o.T. (Ref. CRE (IB) 56160/51)*.

CONTRACTS PLACED

Grimsby T.C. Electrical installation at Chelmsford Ave. secondary modern school, N. G. Bailey and Co. Ltd., £9,540.

Shrewsbury T.C. Electrical rewiring of Music Hall, Williams Bros., £2,692.

Southport T.C. Installation of electricity services in 220 houses on Central Ave. and Guildford Rd. estates, Brooks and Southworth, £4,780.

Swinton and Pendlebury T.C. Electrical installation in 100 houses on estate No. 1, W. Lee, Atherton, £3,064.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Dickson and McLinden Ltd., 5 Camden St., Liverpool 3. To take over the business of a refrigeration and electrical engineer carried on at 99b High St., Wavertree, Liverpool, by Gerard McLinden, as "Dickson and McLinden." etc. Cap.: £1,000. Dirs.: G. W. McLinden (permanent) and Mrs. A. McLinden.

E. and B. Insulations Ltd., 120 George St., Croydon. Manufacturers of and dealers in insulating materials and components, etc. Cap.: £2,000. Dirs.: N. A. Evans and L. W. Basson.

Henry Eade Ltd., 23 Crendon St., High Wycombe, Bucks. Manufacturers of and dealers in electrical and mechanical apparatus of all kinds, and in particular, wireless sets, valves, gramophones, television sets, etc. Cap.: £1,000. Dirs.: J. James and Mrs. M. J. James.

High Definition Films Ltd. To develop, experiment and carry on any research for the improvement of cinematograph, electronic and stereoscopic films, colour photography, television and any other process, etc. Cap: £100. Dirs.: To be appointed by subscribers. Subs.: N. R. Collins, 2 Meadway, N.W.11, and Viscount Duncannon, 6 Hyde Park Cres., W.2.

Your Queries — Answered

"Omalite" desk lighting fitting, makers of? W.W.—Office Machinery Ltd., 3 Vere St., London W.1. (19763)

3 ft. dia. turntable, suppliers of? D.L.—Display and Exhibitions Ltd., 167/171 Queensway, London W.2. (19772)

"Western Microstats" thermostats, makers of? T.B.—Western Incubators Ltd., East Hanningfield, Chelmsford. (19778)

Lamp marking outfits, makers of? W.H.—Glamat Co., Ltd., Abbey House, Victoria St., London S.W.1. (19786)

"Alpha-Harris" generators, suppliers of? W.E.—Electrical Eng. Construction Co., Ltd., Seymour Wharf, Totnes, Devon. (19792)

"Empire" knife grinders, makers of? C.B.—These were made by British Emulsifiers Ltd., Edison Rd., London N.8. This firm are no longer able to supply spares as their factory was bombed. (19803)

"Cheeto" food mixer, makers of? T.E.—John Perry and Co. (Plastics) Ltd., 105 Baker St., London W.1.

The above are selected from questions we have answered this week. If you have a query, send it to us.

T. E. Lewis (Engineers' Agents) Ltd., 52a The Exchange, Docks, Cardiff. Electricians, electrical contractors, etc. Cap.: £100 Dirs.: T. E. Lewis, C. C. Bleach and J. W. Bleach.

L. T. Machinery Ltd., 67 Amberley Rd., Leeds. General, constructional, mechanical, motor and electrical engineers, machinery manufacturers, etc. Cap.: £1,000. Dirs.: T. N. B. Keighley, J. C. Webster and Margaret E. B. Webster.

Secundalux Ltd., 143 Walter Rd., Swansea. Manufacturers of and dealers in electrical goods, etc. Cap.: £500. Dirs.: P. A. Duncan, Mrs. M. A. Evans, O. Dennis, D. A. Jones and O. J Benjamin.

TRADE NOTES

Changes of Address. As from May 1, the address of the works of Colton Electrical Equipment Co. Ltd., will be Cranham Works, Moor Lane, Cranham, Upminster, Essex. Telephone Upminster 4454.

Arising from the Borough of Swansea reconstruction plan, the premises occupied by the British Thomson-Houston Co., Ltd., District Office and Mazda trade counter, is now designated "12/13 The Kingsway" (formerly 4/5 Northampton Gardens, Swansea). Telephone: Swansea 2151/2 remains unaltered.

As from April 9, the Hotpoint Electric Appliance Co.'s Norwich district office (manager—Mr. F. Stannard) will change its address from St. Michael's Chambers, St. Andrew's Street, to: 22 St. Benedict's Street. The telephone number will remain Norwich 20863.

Bestfrend. As a result of the need for greatly increased production to meet home and export commitments, the Bestfrend Electrical Co. Ltd. has decided to transfer its final assembly and service departments to new premises at Shrubland Works, Banstead, to which address all service enquiries and correspondence should be sent after April 14. Diceland Works will be replanned for the manufacture of small motors only.

Agents.—Newman Industries, Limited, of Yate, Bristol, announce that they have now been appointed sole selling agents for the United Kingdom for Franco Tosi and Sisma diesel engines, and are able to offer early deliveries.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	210 0 0	£196 0 0
Delivered in 2nd and 3rd month after order	213 10 0	—
Delivered in 4th, 5th and 6th month after order	225 0 0	—
LEAD, good soft pig (foreign)	160 0 0	136 0 0
,, ,, ,, "English" quality	161 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) (Cash)	1260-1270	—
,, (3 months)	1200-1205	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	160 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	46 10 0	—
Mild Steel Tape (0.04 in.)	26 10 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

British Electric and General Insulators, Ltd. Meetings of members and creditors at Taylor Harman and Co., 11 Haymarket, S.W.1, on May 3 at 10.30 and 10.45 a.m., respectively.

E. F. Electro Ltd. Meeting of members to be held at 37 Norefold St., W.C.2, on April 30 to receive liquidator's report.

Green Electrical and Engineering Co., Ltd. Resolution for voluntary winding-up passed at meeting on Mar. 14. H. Campbell-Bakes of Eric E. Potter and Co., Midland Bank Chambers, James St., Harrogate, appointed liquidator.

London. Peerless Refrigeration Ltd., Park Lane, W.1. Meetings of creditors and contributories at Inveresk House, Strand, W.C.2, on April 6 at 1130 a.m. and 12.15 p.m. respectively. Appointment of liquidator.

Luton. Electrical and Car Services (Luton) Ltd. Alfred G. A. Hayman, 48-52 Stuart St., Luton, Beds., appointed liquidator.

John Priestley Ltd. Resolution for voluntary winding-up passed at meeting on March 20 with Eric Howard Freeman, Daimler House, Paradise St., Birmingham, as liquidator.

Public Utilities (Electric), Ltd. Particulars should be sent to John Baldock, Chartered Accountant, Midland Bank Chambers, Westgate, Grantham, the liquidator, by Apr. 30.

Rail and Structural Welding Co., Ltd. Alexander Key Fison, Spencer Hse., South Place, E.C.2., appointed liquidator.

R. Sawrey Ltd. Extraordinary resolution for winding-up passed at meeting on March 19. Percy Cordwell, 93 Queen St., Sheffield 1, was appointed liquidator.

BANKRUPTCY ACTS

Application for Discharge

Barrow and Ulverston. Samuel G. Penrith, electrical contractor, trading at 5 and 14 Mount Pleasant, Barrow-in-Furness. Hearing at Magistrates Court, Lawson St., Barrow-in-Furness, on April 11 at 10.30 a.m.

Intended Dividend

Brighton. Albert M. Willmore, trading as electrical and radio engineer at 45 King St. Last day for receiving proofs, April 13. Trustee is E. C. Sherwood, Official Receiver, 8 Old Steine, Brighton.

First Meeting

Haverfordwest. William Pickersgill, electrical engineer, trading at the Garage, Clarbeston Rd. Meeting at Official Receiver's Office, 4 Queen St., Carmarthen, on April 6. Public examination at Shire Hall, Haverfordwest, on May 29 at 11.45 a.m.

Release of Trustees

London. Arthur Henry Smith, electrical engineer, trading at 62 Lower Sloane St., S.W.1. Trustee was T. J. M. Macleod, 4 Bucklersbury, E.C.4. Date of release, Feb. 23.

Preston. Albert Fredk. Howsley, trading as electrical engineer, at 25 Emesgate Lane, Silverdale. Trustee was Arthur Tyldesley Eaves, chartered accountant, of 47 Mosley St., Manchester 2. Date of release, Feb. 14.

Dividend

Northampton. F. A. Barratt, A. J. Barratt and J. P. Smart, manufacturers of wireless sets and components, trading as "Excel Radio Components" at 53 Abingdon St., Northampton. First and final dividends of 2s. 0¼d. in £ payable on Apr. 6 at Official Receiver's Office, 6 The Parade, Northampton.

BUSINESS PROSPECTS

HOME

Bedford T.C. Scheme in hand for erection of a block of 54 flats in Ashburnham Road.

Birkenhead T.C. Construction of 130 houses on the Woodchurch estate. H. J. Rowse, Martins Bank Building, Water St., Liverpool.

Birmingham. Council proposes to build 235 shops with living accommodation above on the Chestnuts, Chard End, Bartley Green, Lea Hall and Kents Moat estates. Regional Hospital Board recommended to approve £2,050 scheme for renewal of lighting and power mains and rewiring of power points at Winson Green Mental Hospital.

Blaby (Leic.) R.D.C. Council to build 26 houses at Whetstone, 28 at Croft, 16 at Cosby and 18 at Countesthorpe.

Borehamwood (Herts). Scheme approved for erection of a block of nine shops and maisonettes at estimated cost of £43,000.

Bradford. Council to apply for sanction to borrow £26,500 for rewiring electrical installation in town hall.

Carrickfergus (Antrim) T.C. Plans approved for construction of primary school at Sunnylands, and classrooms at local modern school.

Chester-le-Street R.D.C. Council has been asked to build 200 houses for miners at Beamish Mary, Handon Hold and Pelton collieries. A similar scheme is to be carried out at Kibblesworth colliery.

Crewe T.C. Application to be made to proceed with erection of 40 houses on Wistaton Green estate and 82 bungalows on Middlewich St. estate.

Darlington R.D.C. Plans approved for completion of Aycliffe estate, providing for further 37 houses.

Earby (Yorks) U.D.C. Ministry has approved scheme for 160 dwellings.

Hendon T.C. It is proposed to erect 118 houses on a site in Lawrence St., Mill Hill.

Hull. Forty houses to be built on Bilton Grange estate. City Architect's Dept., Guildhall.

Kerrier (Corn.) R.D.C. It is proposed to build 24 houses at St. Keverne.

Keynsham U.D.C. Erection of 37 houses on Norman Rd. estate. Engineer and Surveyor, Council Offices, Keynsham, Bristol.

Kiveton Park (Yorks) R.D.C. Erection of 60 houses at Wales and 32 at Hartnill. Council's Architect, B. D. Thompson, 83 Bridge St., Worksop.

Knottingley (Yorks) U.D.C. Erection of 61 houses in Ferry Bridge Rd. J. G. L. Paulson, Architect and Surveyor, 29 Roper Gate, Pontefract.

Lambeth. County secondary school to be built at Tulse Hill, estimated to cost £294,260.

Lowestoft. Plans have been approved for erection of infants' school in Enstone Rd.

Middlesbrough. A £160,000 county college will probably be included in next year's building programme. Also T.C. is recommended to apply for sanction to borrow £4,500 for construction of children's home at Beechwood.

Morley T.C. Tenders being invited for all or separate trades in erection of 96 houses on Asquith Av. estate. M. H. Brook, Housing Director, National Provincial Bank Chambers, Queen St.

Newcastle - under - Lyme T.C. Erection of 100 houses on Windermere Rd. estate. Architect is C. B. Parkes, Estate Office, Bourneville, Birmingham.

Newhaven U.D.C. Construction of 20 dwellings and 4 shops with flats on Meeching estate. Engineer and Surveyor, Council Offices.

Newry (Co. Down). U.D.C. proposes to erect 150 houses in Rooney Meadow.

North Kesteven R.D.C. Construction of 40 houses and 2 bungalows on three sites. Council's Surveyor, J. Chadwick, 31 Clasketgate, Lincoln.

Northumberland. Plans approved for proposed Ovington new county modern school.

Peterborough. Erection of 76 semi-detached houses on Eastfield estate. F. J. Smith, City Engineer and Surveyor, Town Hall.

Portsmouth. Council is to build a block of 30 flats at Portsea and 16 flats at Lion Terr.

Ruislip-Northwood U.D.C. Erection of 60 houses in Castleton Rd. Engineer and Surveyor to Council, Council Offices, Oaklands Gate, Northwood, Middx.

Shardlow (Derby) R.D.C. Tenders to be invited shortly for erection of 28 flats and 8 houses at Spondon.

Shoreditch. Messrs. Arcon are architects for erection of 56 flats on Arden estate; also scheme has been prepared for development of same estate involving erection of 68 flats and 35 maisonettes.

Shropshire. Erection of welfare centre at Newport. A. G. Chant, County Architect, Column House, London Rd., Shrewsbury.

Walton (Surrey) T.C. Detailed plans have been approved for erection of 148 houses in Burwood Road.

Wandsworth. Scheme approved for erection of 183 flats, 24 maisonettes on Barn Elms Park site.

Whiston (Lancs) R.D.C. Layout plans approved for 102 houses in Pottery Lane.

Wilton T.C. W.D. proposes to erect 35 houses in Burcombe Lane and council is to invite tenders for erection of 12 houses.

OVERSEAS

Brazil. Auto Industrial Comercial Ltda., Rua da Belgica 1, Bahia, want U.K. agencies for refrigerators, stoves, floor polishers, washing machines and domestic fittings.

Canada. Automotive Products Co. Ltd., 3282 Wellington St., Montreal, wish to conclude an agency agreement with a U.K. manufacturer of petrol or diesel engine driven generating sets of 800 to 10,000 W capacity, 110 V. Firms should contact Mr. H. R. Finestone, President, direct.

Holland. Gedeha, 2a Havenstraat, Heemstede, seeks purchase quotations for plastic-coated wire and electric cord; also fluorescent lighting equipment complete with tubes, reflectors and transformers.

Italy. Allessandro Amici, Via Astolfo 6, Milan, wants direct purchase quotations or agency for household and industrial refrigerators and parts.

New Zealand. Well-known company requires agencies for washing machines, refrigerators, toasters, kettles, irons, cake mixers and razors. Interested firms should contact the company's London buyers, Nathan and Allen, Ltd., 131 Victoria St., S.W.1.

MEETINGS TO NOTE

THURSDAY. APRIL 5

A.S.E.E. (S. London Branch).—"Electric Light." L. S. Atkinson. Cafe Royal, Croydon, 8 p.m.

I.E.E. (London).—"Development of the Electrical System on the Bristol Brabazon Aircraft." M. J. J. Cronin. Savoy Place, 5.30 p.m.

I.E.E. (Rugby Sub-centre).—Annual meeting at E.M.E.B., High St., 6.30 p.m.

I.E.S. (Cardiff Centre).—"Colour and Lighting." S. A. Wood. S. Wales Elec. Board, The Hayes, 5.45 p.m.

PHYSICAL SOC. Annual meeting. "Stimulation Sound Perspective on Two Channels," Dr. G. F. Dutton; "The Haas Effect," P. H. Parkin. Royal Inst. of Brit. Architects, 2.45 p.m.

FRIDAY, APRIL 6

A.S.E.E. (Liverpool Branch).—"Methods of Assessing and Charging for Electrical Energy." B. R. Campbell-Kelly. Elect. Showrooms, Whitechapel, 7 p.m.

I.E.E. (S.W. Sub-centre).—Dinner, dance and visit of President at County Hotel, Taunton, 6.30 p.m.

I.E.E. (Sheffield Sub-centre).—Annual dinner and dance at Royal Victoria Station Hotel, 6.30 p.m.

I.E.S. (Bath and Bristol Centre and Exeter Group).—Presidential address by L. J. Davies, and luncheon. Grand Hotel, Bristol.

I.E.S. (Huddersfield Group).—"Safety and Vision." E. W. Murray, Elect. Showrooms, Market St., 7.15 p.m.

I.E.E. (Bristol Students' Section).—"Electrical Remote Measurements in Aircraft." E. L. Harrington. Electricity House, Bristol, 7 p.m.

MONDAY, APRIL 9

I.E.E. (Norwich).—"Detection by Oscillographic Methods of Winding Failures during Impulse Tests on Transformers." E. C. Rippon and G. H. Hickling. Royal Hotel, 7.30 p.m.

I.E.E. (Merseyside and N. Wales Centre).—Annual meeting at Liverpool Royal Instn., Colquitt St., 6.30 p.m.

I.E.E. (N.E. Centre).—Annual meeting and conversazione. Royal Station Hotel, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilization Group).—"Selection of Transformers for use in Distribution Networks." E. Tobin. Imperial Hotel, Birmingham, 6 p.m.

I.E.E. (London Students Section).—"CO_2 Equipments." D. W. Foster and W. E. M. Arundel. Savoy Pl., 7 p.m.

I.E.E. (N.W. Centre).—"The London-Birmingham Television Radio-relay Link." R. J. Clayton, D. C. Espley, G. W. S. Griffiths and J. M. C. Pinkham. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (N. Ireland Centre).—"Modulation." T.P. Allen. Queen's University, Belfast, 6.45 p.m.

I.E.S. (Stoke-on-Trent Group).—"Lighting in the Pottery Industry." H. Wade Harvey. 31 Kingsway, 6 p.m.

TUESDAY, APRIL 10

A.S.E.E. (Bolton Branch) "Distribution." J. Yates. York Cafe, Gt. Moor St., 7.15 p.m.

INST. OF MARINE ENGRS.—"Electrical Machinery of Cargo Liners." J. B. Peacock. 85 Minories, E.C.3, 5.30 p.m.

I.E.E. (N.W. Centre).—"The London-Birmingham Television Radio-relay Link." R. J. Clayton, D. C. Espley, G. W. S. Griffiths and J. M. C. Pinkham. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E.(N. Ireland Centre).—"Modulation." T. P. Allen. Queen's University, Belfast, 6.45 p.m.

I.E.S. (Stoke-on-Trent Group).—"Lighting in the Pottery Industry." H. Wade Harvey. 31 Kingsway, 6 p.m.

I.E.E. (N. Midland Centre).—Discussion on "Relative Advantages and Disadvantages of Gas and Electricity in Industrial and Domestic Application." Y.E.B. Offices, Ferensway, Hull, 7.30 p.m.

WEDNESDAY, APRIL 11

I.E.E. (London Radio Section).—"V.H.F. Field-strength Survey on 90 Mc/s." H. L. Kirke, R. A. Rowden and G. I. Ross. "Propagation of Metre Radio Waves Beyond the Normal Horizon." Part I by J. A. Saxton and Part II by J. A. Saxton, G. W. Luscombe and G. H. Bazzard. Savoy Pl., 5.30 p.m.

I.E.E. (N.E. Scotland Sub-centre).—Annual meeting at Caledonian Hotel, Aberdeen, 7.30 p.m.

I.E.E. (Southern Centre).—"Electrical Properties of Nerve and Muscle." Dr. W. E. Floyd. R.A.E. Tech. College, Farnborough, 7.30 p.m.

NORTHAMPTON ELECTRICAL ASSOC.—"Small Automatic Switchgear Applicable to Multi-motor Controllers." C. Cosgrove and J. Williamson, 7 p.m.

I.E.E. (S. Midland Students Section).—"Switchgear." L. Dracquer. Jas. Watt Memorial Inst.

THURSDAY, APRIL 12

I.E.E. (London Utilization Section).—"Modern Developments in Electric Welding." H. G. Taylor. Savoy Pl., 5.30 p.m.

I.E.E. (Southern Centre).—Faraday lecture on "Lamps and Lighting." L. J. Davies. Guildhall, Southampton, 6.30 p.m.

I.E.E. (Swansea Sub-centre).—"Influence of Rectifier Harmonics in a Railway System on the Dielectric Stability of 33 kV Cables." S. B. Warder, E. Friedlander and A. N. Arman. Plaza Cinema, 6 p.m.

I.E.S. (Leicester Centre).—Brains Trust. E.M.E.B., Charles St., 6.30 p.m.

I.E.S. (Manchester Centre).—Annual meeting followed by "Home Lighting." J. N. Aldington. College of Technology, Sackville St., 6 p.m.

I.E.S. (Bradford Group).—Lighting Brains Trust. Y.E.B., Sunbridge Rd., 7.30 p.m.

DUNFERMLINE ELECTRIC SOCIETY.—"Rotating Machinery." H. E. C. Clapham. Unitas Hall, Queen Anne St., 7 p.m.

FRIDAY, APRIL 13

I.E.E. (London Education Circle).—Discussion on "The Presentation of Laboratory Experiments." Savoy Place, 6 p.m.

I.E.E. (N. Staffs Sub-centre).—Report on "Education and Training of Electrical Technicians." K. R. Evans. King Edward Grammar School, Stafford, 7 p.m.

E.D.A.—Annual luncheon followed by A.G.M. Connaught Rooms, London.

A.S.E.E. (Crewe Branch).—"Battery Vehicles." R. D. Morgan. Crewe Arms Hotel, 7.30 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Columbia. B687,618. Class 9. Television receivers. Columbia Graphophone Co. Ltd., Blyth Rd., Hayes.

Etronic (with design). 694,181. Class 9. Wireless and television instruments and apparatus. Hale Electric Co. Ltd., Radio Works, Talbot Rd., West Ealing, W.3.

Helaprene. 694,454. Class 17. Articles made from neoprene latex for sheathing, sealing (covering) and for insulating purposes. Hellermann Electric Ltd., Tinsley Lane, Crawley, Sussex.

Leo. 695,083. Class 9. Electronic calculating apparatus. J. Lyons and Co. Ltd., Cadby Hall, London W.14.

Miteacon. 693,537. Class 9. Loudspeakers, sound amplifiers, headphones, etc. 693,538. Class 10. Electro-medical apparatus; and hearing aids for the deaf. General Acoustics Ltd., 6/10 Douglas St., London S.W.1.

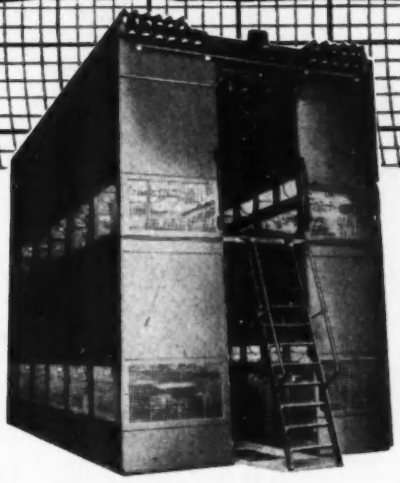
Picopac. 695,951. Class 10. Hearing aids for the deaf. Thomas Thirsk, Cameron Rd. Works, 41, Lodge Rd., West Croydon.

Rectaflex. 685,618. Class 9. Electrical apparatus and instruments. Telemaco Corsi and Emilio Palamidessi, Via G. Prati 3, Rome.

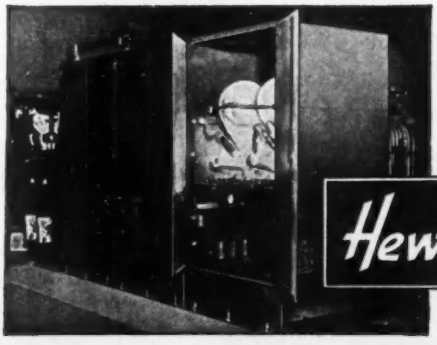
Sustained full load

HEWITTIC Rectifiers have proved the ideal converting plant for the arduous conditions of electrolytic supply; an application in which the converting plant is required to operate continuously at full load for long periods, and where continuity of supply is of high importance — emphasising once more the supreme reliability of

HEWITTIC RECTIFIERS



An 8,750 kW. Hewittic Rectifier supplying an electrolytic plant. This is the world's largest glass-bulb rectifier



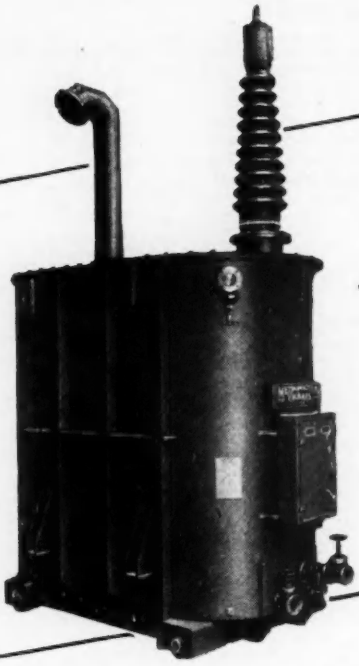
OVER A MILLION kW. IN WORLD-WIDE SERVICE

Hewittic Rectifiers

A Hewittic industrial rectifier of the patented group-unit type : capacity 600 kW.

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

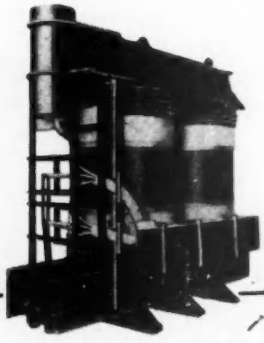
Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames



METROVICK TRANSFORMERS for HYDRO-ELECTRIC INSTALLATIONS

Metrovick have been supplying large transformers for hydraulic installations for many years, and a recent important installation was for 9 single phase transformers to form 3-30 MVA 3 phase Groups—ratio 11/165 kV. The top photograph shows the transformer in its tank. The lower illustration shows the core and windings.

You are invited to visit STAND 20 at the North of Scotland H.E. Board Exhibition DUNDEE, April 10—14



METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17
Member of the A.E.I. group of companies

METROVICK *Transformers for reliable service*

E/A101

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

SPALDING URBAN DISTRICT COUNCIL

STREET LIGHTING

TENDERS are invited for supply and erection of Sodium Vapour and Fluorescent Street Lighting to Group A standard on Trunk Road A.16 in the Urban District of Spalding, which includes 61 140-watt Sodium Vapour and 23 3 x 80-watt Fluorescent Lamps.

Tenders are also invited for supply and erection of 21 3 x 80-watt Fluorescent Street Lamps to Group A standard on other roads in the town.

Applications for specifications, schedule and maps to be made to the undersigned and to be returned in sealed envelope endorsed "Tenders for Street Lighting" by noon on May 1, 1951. The Council do not bind themselves to accept the lowest or any tender.

RAYMOND W. HASTINGS,
Clerk to the Council.

11 Market Place, Spalding, Lincs. (K 339)

CITY OF BELFAST

Electricity Department

CABLES AND ACCESSORIES

TENDERS are invited for the supply, delivery, and installation of 33 kV and 6·6 kV cables and accessories.

Form of tender (No. N.1005), conditions and specification (in quadruplicate), may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne, 1, on payment of a deposit of five guineas (cheques to be made payable to the Belfast Corporation Electricity Department), which deposit will be refunded provided a bonafide tender be lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas per set, which sum will not be returnable.

Each tender, in quadruplicate, in sealed envelope marked "Tender for 33 kV and 6·6 kV Cables and Accessories, Electricity Committee" and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, April 27, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered. The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
March 30, 1951. (K 340)

APPOINTMENTS VACANT

MIDLANDS ELECTRICITY BOARD

North Staffordshire Sub-Area

APPLICATIONS are invited for the position of JUNIOR ENGINEER in the construction section at the Sub-Area headquarters, 31 Kingsway, Stoke-on-Trent.

Applicants should have had experience in distribution work, particularly the maintenance and construction of high voltage and low voltage overhead and underground cables and substations. The duties will include the preparation of schedules of working details. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement and the salary will be in Class "J," Grade 15, £435/£451 per annum.

Applications, stating age, present salary, qualifications and experience and present position, should be endorsed "Junior Engineer Construction" and forwarded within fourteen days to Mr. H. A. P. Caddell, Sub-Area Manager, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS,
Secretary.
(K 309)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER (Construction) in the Generation (Construction) Department. Applicants must hold the Higher National Certificate in Mechanical and/or Electrical Engineering, or be corporate members of the I.E.E. or I.Mech.E., and should preferably have had workshop training.

Salary and conditions of service will be in accordance with the National Joint Board Schedule, Class "AX" (3) commencing at £437 per annum. The post is superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, should be returned not later than April 12, 1951.

W. S. BURGE,
Divisional Controller.
(K 269)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER (Civil) in the Generation (Construction) Department. The post will be located at the Northampton Power Station.

Applicants must be chartered Civil Engineers or hold other equivalent qualifications, and should be experienced in the design and supervision of civil engineering works.

Salary and conditions of service will be in accordance with Class "AX/DX," Grade 5 of Schedule "C" of the National Joint Board Agreement (£679 to £776 per annum).

The post is superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, East Midlands Division, Barker Gate, Nottingham, and should be returned not later than April 17, 1951.

W. S. BURGE,
Divisional Controller.
(K 271)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for appointments as MAINTENANCE ENGINEERS (Electrical) at the following Power Stations:—

Blackburn Meadows Power Station, Sheffield. Class "H," Grade 6, £751/£783 per annum.

Neepsend Power Station, Sheffield. Class "H," Grade 6, £751/£783 per annum.

Ferrybridge Power Station. Class "H," Grade 6, £751/£783 per annum.

Applicants should have had a wide experience of power station electrical equipment and practical experience of E.H.T. switchgear and protective gear. Preference will be given to candidates who are corporate members of the Institution of Electrical Engineers or who hold equivalent qualifications. The appointment will be subject to conditions of service in accordance with the N.J.B. Agreement and will be superannuable under the Authority's Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed "Maintenance Engineer (Electrical)."

G. A. VOWLES,
Divisional Controller.
(K 310)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments at the new

RYE HOUSE GENERATING STATION, NEAR HODDESDON, HERTFORDSHIRE

This station will have an ultimate capacity of 180 MW.

(a) MAINTENANCE ENGINEER (Mechanical) and
(b) MAINTENANCE ENGINEER (Electrical). Salaries, Class "G," Grade 6, £707 to £737 per annum.
(c) CHEMIST and
(d) SHIFT CHARGE ENGINEERS. Salaries, Class "G," Grade 7, £651 to £679 per annum.
(e) BOILER HOUSE SHIFT CHARGE ENGINEERS. Salary, Class "G," Grade 9, £571 to £597 per annum.
(f) ASSISTANT ENGINEER (OPERATION AND EFFICIENCY). Salary, Class "G," Grade 7, £651 to £679 per annum.
(g) STATION SHIFT CONTROL ENGINEERS. Salary, Class "G," Grade 10, £539 to £561 per annum.
(h) JUNIOR ENGINEERS. Salary, Class "G," Grade 16, £375 per annum to Class "G," Grade 14, £428 per annum.

For (a), applicants should have had experience in the maintenance of mechanical plant, including turbo-alternators and boilers.

For (b), experience in the maintenance of Generating Station electrical plant, including high voltage switchgear.

For (c), should possess a degree in Chemistry and have had experience in the testing of fuels, oil and water.

For (d), should have had experience in the operation of a station fired with pulverised fuel.

For (e), experience in the operation of large pulverised fuel high pressure boilers and associated equipment.

For (f), experience in the efficient operation and testing of large boilers and turbo-alternators.

For (g), experience in the operation of e.h.t. switchgear and load control of turbo-alternators.

The salaries for positions (c) and (f) are provisional and subject to negotiation through the medium of the appropriate negotiating body.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than April 20, 1951. Envelopes should be endorsed with the appointment sought.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (K 327)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER, BURTON-ON-TRENT

APPLICATIONS are invited for the position of Assistant Shift Charge Engineer at Burton-on-Trent Generating Station. Applicants should have sound technical qualifications and experience in the operation and maintenance of modern power stations.

The salary will be in accordance with Class "E," Grade 9, and the appointment will be superannuable under the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, not later than April 23, 1951.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (K 349)

NATIONAL COAL BOARD

APPLICATIONS are invited for the post of ASSISTANT POWER GENERATION ENGINEER in the Production Department at London Headquarters. The duties of the post involve the preparation of schemes for pithead power stations using low grade fuel, and investigations in connection with colliery power supplies generally. Candidates should be corporate members of the Institution of Electrical Engineers or the Institution of Mechanical Engineers; should have served an approved apprenticeship training in power plant engineering; and should have had at least 10 years experience in connection with steam power station operation and/or construction.

Salary according to qualifications and experience, in the range £900-£1,200 per annum. The post is superannuable.

Apply, in writing, giving full particulars (in chronological order) of age, education, qualifications and experience (with dates), to National Coal Board, Establishments (Personnel), Hobart House, Grosvenor Place, London S.W.1, marking envelope TT/304. Original testimonials should not be forwarded. Closing date April 21, 1951. (K 305)

BRITISH ELECTRICITY AUTHORITY

CHEMISTS—RESEARCH LABORATORIES, LEATHERHEAD, CHIEF ENGINEER'S DEPARTMENT

APPLICATIONS are invited from chemists for appointments on the scientific staff of the chief engineer's department in the Research Laboratories at Leatherhead. Candidates should possess a University degree with first or second-class Honours in Chemistry. Preference will be given to candidates with some research experience.

Duties will include testing, development, and research work in the laboratories and in the field in connection with the generation, transmission and distribution of electricity.

Experience in the chemical engineering aspects of the combustion of coal is required for some of the appointments. One appointment will involve analytical work and candidates should have experience in metallurgical analysis and modern physical methods.

The appointments, which are superannuable, will be made within the following grades of the National Joint Board Agreement, Schedule "C" (Headquarters), according to qualifications and experience:—GENERAL ASSISTANT—Grade 5, £465-£594 p.a. rising to a maximum of £656 p.a. THIRD ASSISTANT—Grade 4, £644-£769 p.a. rising to a maximum of £849 p.a. SECOND ASSISTANT—Grade 3, £719-£969 p.a. rising to a maximum of £1,070 p.a. These grading allocations are subject to confirmation by the National Joint Board.

Application forms may be obtained from the Secretary's Office (Establishments), Application Section, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to D. Moffat, Director of Establishments, not later than April 20, 1951.

Please quote reference AE/148. (K 347)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

ASSISTANT ENGINEER (Construction)
Heston District of No. 1 (Southall) Sub-Area. Salary N.J.B. Class "E," Grade 10, Column 1 (£513 per annum including London weighting), and N.J.B. Conditions of Service.

Duties will include assisting the construction engineer in the district in the installation and erection of plant, equipment, the laying of mains, indoor and outdoor substations and other constructional work by direct labour and/or contract on an urban distribution system up to and including 11 kV, including testing and commissioning.

Applications on forms obtainable from Sub-Area Secretary, 2-6 Windmill Lane, Southall, and returned to him not later than fourteen days after the appearance of this notice.

ASSISTANT ENGINEER (Mains)
Isle of Wight District of No. 3 (Portsmouth) Sub-Area. Provisional Salary £450 per annum, subject to adjustment. Conditions of service as prescribed from time to time.

Candidates should have had experience in designing, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems and substation plant and should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him not later than fourteen days after the appearance of this notice, unless a form has already been submitted for the post, in which case a second application will not be necessary.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.
(K 306)

CROWN AGENTS FOR THE COLONIES

CHARGEHAND (ELECTRICAL INSTRUMENT MAKER) required by the East African Railways and Harbours Administration for 40 to 48 months on probation with prospect of permanency. Commencing salary according to age in scale £520 rising to £610. Temporary allowance £90 a year. Free quarters. Superannuation fund. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates between 30 and 40 years of age, must have served a regular apprenticeship as an Electrical Instrument Maker and have good subsequent experience. They should be fully conversant with the manufacture, repair, balancing, testing and calibration of electrical instruments, including switchboard pattern-portable; indicating and recording instruments; volt meters, ammeters, watt meters, moving iron, moving coil and dynamometer type; thermo couplers, temperature indicating and recording instruments, bridge Meggers, etc.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.28514B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (K 312)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

DEPUTY POWER STATION SUPERINTENDENT—Rye House Generating Station

near Hoddesdon, Hertfordshire.

This station will have an ultimate capacity of 180 MW.

Salary in accordance with the N.J.B. Agreement, Grade 3, Class "G" (£885 to £927 per annum).

Applicants should have had a good technical education, considerable practical experience in the operation, maintenance and administration of a large generating station, and should preferably be Corporate Members of one of the recognised Engineering Institutions.

The successful applicant will be expected to reside within a reasonable distance of the Generating Station.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' superannuation scheme.

Forms of application may be obtained from the Divisional controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than April 20, 1951. Envelopes should be endorsed "Deputy Power Station Superintendent—Rye House."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (K 328)

BRITISH ELECTRICITY AUTHORITY

South Western Division

THIRD ASSISTANT ENGINEER (MECHANICAL)—GENERATION CONSTRUCTION DEPARTMENT, PLYMOUTH

APPLICATIONS are invited from suitably qualified candidates for appointment as Third Assistant Engineer (Mechanical) in the Generation Construction Department, at Plymouth.

Applicants should have had appropriate technical and works training, and should be familiar with site erection work, programming and progressing with contractors site staff, and have general experience on modern power station mechanical equipment.

The general conditions of employment will be those negotiated by the National Joint Board and the salary in accordance with Schedule C, Class "AX/CX," Grade 5 (£579 to £710-£738 to £753 p.a.).

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, and should be returned to him not later than April 21, 1951.

R. C. BARRETT,
Divisional Secretary.

March 29, 1951. (K 329)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of SHIFT CHARGE ENGINEER at the Kearsley Generating Station, Stoneclough, near Manchester.

The salary range for this position, which is superannuable, will be £786 to £822 per annum, in accordance with Grade 7, Class "K," of the National Joint Board Agreement.

Candidates should preferably possess technical qualifications, and previous experience in a large modern generating station is essential.

Applications, stating age, qualifications, present position, and giving full details of education and experience should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than April 14, 1951. (K 330)

LONDON ELECTRICITY BOARD

DRAUGHTSMAN

APPLICATIONS are invited for the above position in the North Western Sub-Area. Candidates should be experienced in the following in relation to distribution systems up to 11 kV: (a) Plant and cable layout work. (b) Diagrams. (c) Cable surveys and wayleaves. (d) Telecommunications.

The commencing salary, which is provisional, pending agreement with the appropriate negotiating organisations, will be in accordance with qualifications and experience and will be within the range £300/£500 per annum inclusive.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, on receipt of addressed foolscap envelope, to be returned duly completed within 7 days. Please quote ref. EST/V/1188/T on envelope and all correspondence. (K 323)

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

SHAKESPEARE STREET, NOTTINGHAM

Principal: H. BAKER, Ph.D., A.M.I.C.E., A.M.I.M.E.

APPLICATIONS are invited for the following full-time posts, duties to commence not later than September 1, 1951, in each case.

1. ASSISTANT LECTURER GRADE "B" IN RADIO ENGINEERING. Applicants should possess graduate or equivalent qualifications in electrical engineering and have had industrial and/or Services experience.

2. ASSISTANT LECTURER GRADE "B" IN ELECTRICAL ENGINEERING. Applicants should possess graduate or equivalent qualifications in electrical engineering and should have had industrial and/or Services technical experience. The successful candidate will be expected to teach electro-technology and mathematics to Ordinary National Certificate and Final City and Guilds standard.

Subject to confirmation by the Minister of Education, the salary scale will be £450 by £25 to £725 p.a. A further £60 in respect of a graduate or approved equivalent qualification is payable, plus up to three increments of £18 each for approved periods of training. Regard may be paid to approved industrial experience when assessing the commencing salary.

Forms of application (please specify which post), together with further particulars, may be obtained from the Registrar, Nottingham and District Technical College, Shakespeare Street, Nottingham, to whom completed forms should be returned not later than April 23, 1951.

F. STEPHENSON,
Clerk to Joint Education Committee.
(K 350)

NORTH WESTERN ELECTRICITY BOARD

No. 4 Sub-Area

APPOINTMENT OF METER REPAIRERS (MECHANICIANS)

APPLICATIONS are invited for the appointment of Meter Repairers (Mechanicians) in the No. 4 Sub-Area Testing Stations at Preston, Blackpool and Morecambe.

The wages and conditions of service will be in accordance with the Agreement of the National Joint Industrial Council for the Electricity Supply Industry, the present rate for Meter Repairer (Mechanician) being 36.50d. per hour, equivalent to £6 13s. 10d. for a 44-hour week.

Applications stating age, training, experience and present post, should be received by the Manager, No. 4 Sub-Area, The North Western Electricity Board, 40/41 Lune Street, Preston, not later than Saturday, April 14, 1951.

March 27, 1951. (K 324)

EAST MIDLANDS ELECTRICITY BOARD

Boston District

MAINS FOREMAN—NORTHERN SECTION

APPLICATIONS are invited for the above position. Applicants should possess a good experience of the erection of lines up to 11 kV, the maintenance of lines up to 33 kV and the control of construction gangs on overhead line construction and cable laying. Ability to drive a vehicle would be an advantage. Rates of pay and conditions of service to be governed by N.J.I.C. Agreement, the present rate being 3s. 4½d. per hour. A house will be available for the successful applicant at Spilsby, Lincs. Applications stating age, full details of training and experience should be forwarded to The District Manager, The East Midlands Electricity Board, Besco House, Boston, Lincolnshire, not later than Saturday, April 14, 1951. Envelopes should be endorsed "Foreman." (K 325)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the following appointments:—

SHIFT CHARGE ENGINEER

(a) At Percival Lane Power Station, Runcorn. Salary, N.J.B. Class "G," Grade 7, £651 to £679 per annum.

(b) At Warrington Power Station. Salary, N.J.B. Class "F," Grade 7, £625 to £643 per annum.

Applicants must have had experience in the operation of Power Station plant. Preference will be given to the candidates who are Associate Members of a recognised Institute or who possess equivalent technical qualifications.

The appointments are superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme, and may be subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and returned to him not later than Friday, April 20, 1951.

A. R. COOPER,
Divisional Controller.
(K 354)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATISTICAL ENGINEER
PORTISHEAD "A" POWER STATION

APPLICATIONS are invited for the position of Statistical Engineer at Portishead "A" Power Station.

Candidates should have had a good technical education and training and possess as a minimum qualification the Ordinary National Certificate or its equivalent. Experience in a large power station will be considered an advantage.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "J," Grade 12, £528-£550 per annum. The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than April 21, 1951.

R. C. BARRETT,
Divisional Secretary.

April 2, 1951. (K 358)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SHIFT CHARGE ENGINEER
CASTLE MEADS POWER STATION

APPLICATIONS are invited for the position of Shift Charge Engineer at Castle Meads Power Station, Gloucester.

Candidates should have had good technical experience, a sound knowledge of the operation and maintenance of generating plant and preference will be given to applicants possessing the Higher National Certificate or equivalent qualifications.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "E", Grade 7, £579-£609 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than April 21, 1951.

R. C. BARRETT,
Divisional Secretary.

April 2, 1951. (K 357)

MIDLANDS ELECTRICITY BOARD

Shropshire and Herefordshire Sub-Area

APPLICATIONS are invited for the position of DRAUGHTSMAN at the Sub-Area Offices, Shrewsbury. The duties will consist of the preparation of working and detailed plans for substation buildings, and switchgear layout. Some architectural experience will be an advantage.

The salary will be £375 per annum, which is provisional, and subject to negotiation with the appropriate organisation.

Applications stating age, qualifications, experience, and present employment should be sent within fourteen days to Mr. W. Winwood, Manager, Shropshire and Hereford Sub-Area, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

March 21, 1951. (K 307

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of GENERAL ASSISTANT ENGINEER in the Construction Department at Divisional Headquarters, Woolton, Liverpool.

Commencing salary will be £437 to £515 per annum according to age, qualifications and experience, being Class "AX," Grade 8 of the N.J.B. Agreement, rising to a maximum of £604 per annum.

Applicants should have a good general and technical education, and possession of a degree in engineering or equivalent qualification would be an advantage. Practical experience in power station construction or operation, or alternatively in a heavy plant manufacturer's works would be an asset.

The appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme, and may be subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Tuesday, April 17, 1951. (K 355)

MIDLANDS ELECTRICITY BOARD

Central Gloucestershire Sub-Area

APPLICATIONS are invited for the appointment of TRANSPORT SUPERINTENDENT. The successful applicant will be responsible for the control and maintenance under the Sub-Area Engineer of a fleet of 190 vehicles, including a central repair depot. Applicants should have had experience in a similar capacity. Technical qualifications an advantage.

Salary and conditions in accordance with the National Joint Board, Grade "G10," £539/£561, subject to negotiation.

Applications, in writing, stating age, experience and qualifications, to D. Holt, Sub-Area Manager, Central Gloucestershire, Midlands Electricity Board, 126 London Road, Gloucester.

March 21, 1951 (K 308)

BRITISH ELECTRICITY AUTHORITY

SHIFT CHARGE ENGINEER, Epsom Power Station. Experience in the operation of power station plant and E.H.T. Switchgear essential. Associated membership of the Institute of Electrical or Mechanical Engineers or equivalent preferable. N.J.B. conditions and salary Class "A," Grade 7, £455 per annum inclusive of London Allowance. Applications on forms obtainable from Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-on-Thames, to be returned by April 14, 1951. (K 348)

A MODERN works manufacturing rubber and paper insulated cables, etc., has a vacancy for a qualified and experienced PRODUCTION MANAGER. The position offers good prospects of promotion. Superannuation scheme available.—Applicants should state, age, experience, and salary required, to Box No. 5027, Electrical Times. (K 346)

ABERDARE CABLES LIMITED, Aberdare, require several ESTIMATORS with experience in handling home and overseas enquiries for paper insulated cables.—State age, experience and salary required. (K 201)

AN ASSISTANT ENGINEER is required for work in connection with the application of semi-conductors (in particular, voltage dependent materials) to industry. Applicants must be of Higher National to degree standard. Salary according to age, qualifications and experience.—Reply, giving full particulars, including age, education, experience, qualifications, etc., marking envelopes "Research," to Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17. (K 342)

APPLICATIONS are invited for the post of ASSISTANT INSPECTOR to the Ceylon Fire Insurance Association in Colombo. Applicants should have had comprehensive training in electrical engineering, embracing a five years' apprenticeship and general experience in installation work, particularly in connection with wiring for lighting and power, and possess a sound general knowledge of mechanical engineering and building construction. Candidates should be about 30 years of age, preferably single, well educated and of good address.

Applications and inquiries should be sent to the Secretary, Fire Offices' Committee (Foreign), 65 Watling Street, London E.C.4. (K 320)

ATTRACTIVE vacancies exist at the Liverpool works of the English Electric Co., Ltd., for DRAUGHTSMEN with the experience in the design and detail of medium mechanical equipment or welded fabrications for work of an electro-mechanical nature. Excellent opportunities for advancement in this interesting field.—Write, giving full details and quoting ref. 135C, to Central Personnel Services, English Electric Co., Ltd., 24/30 Gillingham Street, London S.W.1. (K 262)

BOILER HOUSE MANAGER, age 25-35, required by a large and modern industrial company in North-West England. Applicants should possess a thorough knowledge of, and experience in, the operation and maintenance of high pressure automatic stoker fired water tube boilers and their auxiliaries, and should have Higher National Mechanical Certificate or First-class Board of Trade Certificate in Steam. An attractive commencing salary will be offered. To the right man this a permanent, progressive and pensionable appointment. Replies will be treated in strict confidence.—Please send brief particulars of age, experience, etc., to Box No. 5023, Electrical Times. (K 344)

COST CLERK. Small electrical engineering firm in Manchester requires a Cost and Stores Ledger Clerk. Good knowledge of costing essential, must be able to work on own initiative. Student of recognised institute preferred. Permanent situation for suitable applicant.—Reply, with references, age, wages required, etc., Box No. 5019, Electrical Times. (K 326)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

SWITCHGEAR

Johnson & Phillips Ltd. require two SENIOR DRAUGHTSMEN. Applicants must be suitably qualified and competent to handle switchgear for indoor and outdoor main stations and sub-stations up to 33,000 V, or to design switchgear apparatus embracing air break and oil break circuit breakers. Both positions offer good scope to the right man, with prospects of early promotion.—Applications, in writing, stating age, experience and salary required, to **Employment & Welfare Manager JOHNSON & PHILLIPS Ltd., CHARLTON, LONDON, S.E.7** (K 298p)

CABLE-MAKERS require FOREMAN for new Plastics Department: Polythene, P.V.C. and Nylon. Most up-to-date machinery. Progressive post.—Box No. 5029, Electrical Times. (K 350)

DRAUGHTSMAN (Electrical) required in the engineering department of department store. State salary and experience.—Apply, Chief Engineer, Lewis's, Ltd., 21 Leigh Street, Liverpool 1. (K 313)

DRAUGHTSMAN required (Walthamstow area). Applicants must have served apprenticeship and have had good general experience. Good working conditions. Pension scheme.—Reply, stating age, experience and salary required to, Box No. 5031, Electrical Times (K 351)

DRAUGHTSMAN wanted by makers of industrial electrical control gear. London area.—Full details, experience, age and salary to Box No. 5033, Electrical Times. (K 352)

ELECTRICAL DRAUGHTSMEN, one senior, one junior, required, West Midlands. Experienced low tension control gear layouts and diagrams. Senior man must have knowledge heavy plant layout. Compulsory pension scheme. Canteen facilities. State age, if married, present salary, and give references.—Box No. 4041, Electrical Times. (K 120)

ELECTRICAL ENGINEER DRAUGHTSMAN required with experience in the design and installation of power and lighting schemes, distribution and control diagrams, etc. Excellent prospects for suitable men offered by Teesside firm.—Apply, giving full particulars, quoting reference, to Box No. 5025, Electrical Times. (K 345)

ESTIMATOR required with experience in preparing tenders for all classes of a.c. and d.c. electrical rotating machinery, switchgear, etc., and familiar with standard specifications. 5-day week. Pension scheme.—Applications should state age, full details of experience, salary expected, to Personnel Manager, Lancashire Dynamo and Crypto, Trafford Park, Manchester 17. (K 361)

EXPERIENCED ASSISTANT ESTIMATOR required; must be able to take off and prepare tenders for all systems. Age 30/40.—Apply, with full particulars, to Christy Bros. Ltd., 171 Broomfield Road, Chelmsford.(K 316)

FIRST-CLASS TOOL DESIGNER DRAUGHTSMAN required by leading firm of switchgear manufacturers. Only persons of the highest experience in modern production methods, including progressive tool design, will be considered.—Salary required and details of experience to Box No. 4089, Electrical Times. (K 255)

FOREMAN. Applications are invited for the position of Foreman in the Sub-Area Meter Repair Department, No. 1 (Southall), Sub-Area, Waterloo Road, Uxbridge. Candidates should be capable of taking charge and supervising the work of a large meter-repair department, and have had superior experience in the repair of all types of single and three-phase meters, in particular prepayment and two-part tariff meters, maximum demand attachments, instruments and time switches. Some manufacturing experience would be an advantage. Conditions of service and rate of pay in accordance with the National Joint Industrial Council Agreement dated July 20, 1949. Applications, stating full details of qualifications, experience, age, etc., should be addressed to the Sub-Area Engineer, Southern Electricity Board, No. 1 (Southall) Sub-Area, Waterloo Road, Uxbridge, Middlesex, not later than April 13, 1951. Short listed applicants will be interviewed on April 23, commencing at 10.30 a.m. (K 334)

FULLY experienced CHIEF DRAUGHTSMAN DESIGNER required by leading switchgear manufacturers. Capable of taking charge of all final drawing development work and of staff. Experience in design work of the highest technical standards essential.—Salary required and full record of experience to Box No. 4067, Electrical Times. (K 254)

HOOVER LTD. require an ENGINEER for the Time and Motion Study Department of their main works. Applicants should have had an engineering apprenticeship and at least five years' experience in speed and effort rating on every element. Some motion and methods study is involved. Suitably qualified men are invited to write giving full details of age, education, qualifications and experience, to The Employment Officer, Hoover Ltd., Western Avenue, Perivale, Middx. (K 315)

LADY DEMONSTRATOR required by leading manufacturers of electric cookers to undertake duty in the Midlands. Must be experienced and qualified. Good salary.—Particulars to Box No. 5035, Electrical Times. (K 353)

JOHNSON & PHILLIPS have vacancies for the following staff in their Transformer Department:

(1) A TRANSFORMER DESIGNER experienced in dealing with all sizes up to 10 MVA.
(2) DRAUGHTSMEN capable of handling all medium sizes up to 2,000 KVA alternatively 5,000 KVA.
(3) A DRAUGHTSMAN with experience of larger transformers up to 30/45 MVA.

Write, stating age, experience, salary expected to **Employment and Welfare Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, London, S.E.7.** (K 337p)

LAMP MANUFACTURERS, Fluorescent, Incandescent and Miniature, require the following Junior and Senior Staff for their London factories. Unprecedented expansion of production programme necessitates appointments beyond normal up-grading within organisation. JUNIOR TECHNICAL STAFF: Applications invited from (a) Technicians with experience in lamp or valve making. (b) University Students or Graduates with engineering and physics qualifications for fluorescent and incandescent departments. SENIOR TECHNICAL STAFF: Applications invited from Lamp Engineers and Technicians with experience of controlling processes for fluorescent and filament departments. These posts are permanent and ultimately pensionable, and offer prospects beyond the average.—Apply, Box No. F5826, A.K. Advg., 212a Shaftesbury Avenue, W.C.2. (K 266)

MANUFACTURERS of electrical cooking and heating equipment require DRAUGHTSMAN for industrial design and development work. Birmingham.—Reply, stating age, experience and salary, to Box No. 5015, Electrical Times. (K 318)

POWER PLANT CHARGE ENGINEER required by major oil company for employment in the Middle East to operate a combined gas and steam turbine station where he will take charge of a shift. Applicants who should be under 30 years of age, must possess a Higher National Certificate in electrical engineering and have served an apprenticeship in the generation division of a power supply organisation undertaking power station control room operation, followed by experience as a boiler house or turbine room charge engineer. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages kit allowance, free medical attention, good leave arrangements, pension scheme.—Write, stating personal particulars and details of qualifications and experience, quoting Dept. F.13.F, to Box 3336 at 191 Gresham House E.C.2 (H 415)

POWER TRANSFORMER ESTIMATING ENGINEER required immediately, age about 25. One holding Higher National Certificate preferred.—Apply, stating age, experience, and salary required, Box No. 5009, Electrical Times. (K 293)

REPRESENTATIVE for E.W.F. wholesaler to work in the Surrey/Sussex area. Previous experience an advantage.—Apply, E. Dawson Limited, 16a London Road, Reigate. Tel.: 2928. (K 333)

REQUIRED, ELECTRONICS/ELECTRICAL DESIGNER, take charge design and dev. wide range covering electronic welding and process controls, small spot welders, rectifier units up to 50 kW. Valve and relay circuitry experience essential. Should have degree or equiv. with practical outlook. State age, experience and salary required.—Hirst Electronic Development, Ltd., Dermody Road, London S.E.13. (K 331)

SALES MANAGER required by manufacturers of electrical resistance materials. The post calls for a man, preferably under 40, experienced in the electrical trade and capable of negotiating at high level by personal contact.—Please submit full details in confidence to General Sales Manager, Hall and Pickles Ltd., 70 Victoria Street, London S.W.1. (K 332)

SENIOR DRAUGHTSMEN with up-to-date experience of h.t. switchgear wanted. Please state qualifications, age and salary required.—Apply: The New Switchgear Construction Co., Ltd., Wellesley Road, Sutton, Surrey. (K 221)

SWITCHGEAR DRAUGHTSMEN FOR JOHANNESBURG. Applicants must have good practical and technical experience, particularly in diagram and schematic work. Single men preferred, age 22 to 25. Applications in writing, stating details of training, experience, age and salary expected, to Employment and Welfare Manager, Johnson and Phillips, Ltd., Victoria Works, Charlton, S.E.7. (K 336)

URGENTLY required for expanding iron and steel works in Southern Rhodesia, ELECTRICAL ENGINEER, MAINTENANCE FITTERS and ELECTRICIANS, Bricklayers, Draughtsmen, Traffic Foreman, Sample Passers and Pitside Foreman. Only men who have sufficient steelworks experience, and who are prepared to settle in Rhodesia, will be considered.—Interested applicants apply to John Miles and Partners (London) Ltd., Consulting Engineers, 76 Cannon Street, London E.C.4, who will supply details of wages and conditions of service. When applying applicants should state experience, age and give full information. (K 360)

THE Brush Electrical Engineering Co., Ltd., Loughborough, have vacancies in their transformer department for DRAUGHTSMEN with good basic training in general engineering. Previous transformer experience not essential. Excellent opportunities for advancement under good working conditions for the right type of men.—Applicants should write giving full details of training, experience, etc., to Central Labour Dept. (K 302)

APPOINTMENTS WANTED

OVERSEAS, BUSINESS AND RESEARCH EXPERIENCE

A QUALIFIED ELECTRICAL AND ELECTRONICS ENGINEER experienced in Research, Development and Business Overseas, is now available to take a position offering attractive salary and opportunity for advancement.

He has an excellent record of service with several major companies and will be interested to discuss various ways of fitting into your organisation.

Would you please write to **Box No. 5011,** Electrical Times, for more information. (K 304p)

AN established connection with the B.E.A.'s wholesale and retail available manufacturer domestic commodities. Southern Counties. Expenses and commission basis.—Box No. 5021, Electrical Times. (K 343)

INSTALLATION ENGINEER (39), planning, estimating and supervision of large installations. Commercial, sales and administrative experience. Recently completed large contract abroad for British concern. Preferably London area. Full particulars on request.—Box No. 4067, Electrical Times. (K 175)

AGENCIES

HEATING PADS AND BLANKETS made by competitive German firm specialised in this field for 25 years. Agents selling to wholesalers, the B.E.A. or other large organisations are invited to write with confidence for details, giving territory covered. Other domestic appliances produced by German firms will shortly be available.—Box No. 4093, Electrical Times. (K 273)

SOUTH AFRICA. Director of old-established engineering agency company located Johannesburg, with branches throughout the Union, arrives England shortly desirous of meeting principals of engineering manufacturers wanting agency representation. Advertisers mainly interested in specialist finished electrical and mechanical equipment not readily manufactured overseas.—Applications are asked in first place to Box No. 5013, Electrical Times strict confidence being guaranteed.(K 314)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

CASTINGS. Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (H 268)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel. 32996), electrical engineers and winding specialists. Distance no object. (F 739)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

ELECTRICAL STEEL OFF-CUTS OR COREPLATES required. Small and large quantities taken, approx. 0·024-in. gauge, minimum width 3 in.—Box No. 4077, Electrical Times. (K 219)

ENAMELLED COPPER WIRE 25, 26, 30, 31, 32, 34 S.W.G. BRASS ROD, ⅛, 3/16, ¼, 5/16 ⅜, ½ diam. Offers of any small quantities of these welcomed. Urgently needed.—Cox-Walkers Ltd., Feethams, Darlington. (K 341)

ENAMELLED OR RAYON/SILK COPPER WIRE required 27-30 s.w.g.—Renas Eng. Co. Ltd., 107 Albert Road, S.E.25. Tel. ADD 6055. (K 245)

KETTLE CONNECTORS, circular. Purchase of a complete set of tools for above also considered.—Box No. 4097, Electrical Times. (K 275)

STEEL, ALUMINIUM, BRASS, sheets, strip, bars, offcuts. Any quantity; immediate payments.—Grades Sheared Metal Co. Ltd., Green Lane, Hounslow, Middx. Tel.: Feltham 3274. (K 152)

URGENTLY required, enamelled and textile covered copper wires; also flexes and cables. Copper sheets, brass sheets, aluminium sheets in all gauges, brass rods, rounds. Hex. A/F.—Industrial Suppliers (Cambridge) Ltd., 15a-17 Brecknock Road, N.7 (Gul. 5891/2/3). (K 322)

URGENT. 57½ K.V.A. ALTERNATOR by Alpha Harris required. 400/3/50 supply, 4 wire, 1,500 r.p.m., suitable for direct coupling.—Full details location, price, etc., to Box No. 5017, Electrical Times. (K 319)

WANTED LEWMEX AND SIMILAR COVERED WIRES, 23 to 30 S.W.G.—Quick Service, 121 Woodlands Road, Ilford, Essex. (K 321)

WANTED. Surplus stocks of Hand, Precision and Cutting Tools, Twist Drills, Taps and Dies, Files, Reamers, Cutters, etc.—Send details to B. Draper and Son, 1 Grange Road, Kingston-on-Thames. We pay cash upon delivery. (K 76)

WANTED. SCRAP ELECTRIC MOTORS, DYNAMOS AND CABLE. Top prices paid.—H. Reed, 36 Bridge Street, Leatherhead, Surrey. (K 11)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1 (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Watertube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED, URGENTLY, Diesel Engines, Diesel Generating Sets, Electric Motors from 20 h.p. to 500 h.p.; also Radiator Cooled Diesel Engines from 6 h.p. to 70 h.p.—Write: Box No. 5007, Electrical Times. (K 292)

400, 500, 800 cycle ALTERNATORS or MOTOR GENERATORS wanted. All ratings and voltages. Quantities required.—Wilflo Products, 216-228 Gorbals Street, Glasgow, C.5. (K 301)

EPOCH-MAKING INVENTION

Protected by a British Patent and already introduced abroad with success concerning: "Improvements in or relating to starters for low-pressure fluorescent tubular lamps" is **TO BE SOLD** for a lump sum or exploited under licence.

OFFERS TO BE SENT TO THE

PERUHAG COMPANY LIMITED

SCHWANENGASSE 4, BERNE, SWITZERLAND

(K 338p)

FOR SALE

AUCTIONS

By order of the Ministry of Works.
SURPLUS DEPOT, FEARNHEAD LANE, PADGATE, near WARRINGTON
CHARLES TAYLOR AND SONS
will SELL BY AUCTION at the DEPOT above on WEDNESDAY, THURSDAY and FRIDAY, April 18, 19 and 20
commencing at 11.30 a.m. each day.
SURPLUS STORES AND MATERIALS
comprising Hardware, Ironmongery, Plumbers and Drainsmans Sundries, Builders Hand Tools, ELECTRICAL COMPONENTS, ELECTRIC MOTORS AND CABLE, Steel and Copper Piping and Cisterns, Pumps, Radiators, Combustion Stoves, Heavy Duty Vertical Boilers, Wooden doors, Canteen Equipment, including Refrigerators, small quantity of Paint and many miscellaneous stores.
On view Monday and Tuesday, April 16 and 17, from 10 a.m. to 4 p.m. each day.
Admission by Catalogue only (price 6d.) from the Auctioneers, 28 QUEEN STREET, ALBERT SQUARE, MANCHESTER. Tel. BLACKFRIARS 4418. (K 335)

CABLES & WIRE

FOR SALE, quantity DCC, SOFT COPPER WINDING WIRE, various gauges, Pirelli etc., 2s. 6d. lb. Reels free. Also quantity fine gauges E and SS enam. Lewmex, etc., 3s. 6d. lb.—Box No. 4081, Electrical Times. (K 251)

500 LBS. No. 25 S.W.G. EN and S. RAYON. STOCK. Also various other sizes. If it is enamel or silk covered we may have it.—Phone Greenwich 1672. Saxonia for courtesy and service. (K 359)

200,000 YARDS TELEPHONE TWIN WIRE, No. 14/.0076, packed in export cases of 1,000 yards.—Box No. 4099, Electrical Times. (K 276)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed and immediate delivery. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

NICKEL-CHROME SPIRALS, 80/20 only, and KETTLE ELEMENTS. Enquiries are invited by well-known manufacturers from users of large quantities.—Box No. 4095, Electrical Times. (K 274)

ENGINEERING PLANT & MATERIALS

QUANTITY of ROLLER ASSEMBLIES ideal for cable or material haulage. Rollers 4½ in. diameter by 9 in. between flanges complete with spindles, self-oiling bushes, frame and fixings. Telephone—(London) Ealing 6262. (K 257)

MOTORS & STARTERS

A.A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS GENERATORS, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (D 17p)

ELECTRIC MOTORS 400/440/3/50.
225-h.p. internal S/R motor by A.S.E.A., type M.22, open protected frame, 2 end-shield oil bearings. Mounted on C.I. bedplate, shaft fitted pulley 28 in. diam. by 28 in. face, for flat-belt drive. Rotor volts 482, rotor amps 208. Speed 485 r.p.m. Complete with control gear.
170-h.p. compensated induction motor by E.E.C. (suitable for power factor correction), size AGS.C16, protected type frame with end-shield B/R bearings. Standard shaft extension fitted vee rope pulley. Commutator machine with ext. sliprings. Speed 720 r.p.m. With control gear.
86-h.p. S/R Holmes, speed 485 r.p.m. protected type. Rotor volts 250, rotor amps 180.
Two 75-h.p. S/R motors by L.D.C., screen protected type with end-shield ball bearings. External T.E. cont. rated sliprings. Rotor volts 245/266, rotor amps 142/129, speed 485 r.p.m.
George Cohen, Sons & Co. Ltd., Wood Lane, London W.12 (Tel.: Shepherds Bush 2070), and Stanningley, near Leeds (Tel. Pudsey 2241). (K 279)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

1/50 h.p., 3-phase a.c. MOTORS; 15 tons transformer steel strip.—Full details, J. Fraser (Metals), Ltd., Station Chambers, High Street North, London E.6. Grangewood 4244. (K 199)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80-w. Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

METERS

A.C/D.C. QUARTERLY AND SLOT-METERS. Guaranteed, sent on approval if desired.—Brent Electrical Co., 6 Holmdale Gardens, London N.W.4. (A 15)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

SWITCHGEAR

LARGE quantity of new 15-amp. switchplugs for disposal. Industrial pattern in iron box or recessed pattern without box, 5s. each doz. lots, 4s. 6d. each gross lots. Cash with order.—Courtenay Dale, Streetecourt, Westgate, Kent. (K 311)

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London, N.22. Tel.: Bow 7221. (C 175)

NEW 15-AMP D.P. SKELETON SWITCHES. Over 6,000 to clear.—Box No. 5005, Electrical Times. (K 291)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 176-page handbook, FREE and post free. B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (D 244)

E.P.E.A. The Agreement and the London Members. A Combined London Sections Meeting will be held in the YORK HALL, CAXTON HALL, Westminster, S.W.1 at 6.30 p.m. on Friday, April 20, 1951. (K 317)

RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. Tel.: TEMple Bar 7471. (A 23)

For new and used machine tools . . . power presses . . . sheet metal working and woodworking machinery, etc. . . . **F. J. EDWARDS, LIMITED,** *359-61, Euston Road, London, N.W.1. Tel: Euston 4681-3771. 'Grams: Bescotools Norwest London*

INDEX TO ADVERTISERS

Aeraspray Manufacturing Co., Ltd. 80
Aerialite, Ltd. 89
Alton Battery Co., Ltd. 7
Ateliers de Constructions Electriques de Charleroi 36
Backer Electric Co., Ltd. ... 37
Beetle Products, Ltd. 42
Belling & Co., Ltd. 6
Belmos Co., Ltd. 52
Bill Switchgear, Ltd. 5
Birch, H. A., & Co., Ltd. ... 16
Bowker, S. O., Ltd. 33
British Electricity Authority ... 12
British Electric Resistance Co., Ltd. 40
British Industries Fair 18
British Insulated Callender's Cables, Ltd. 1, 35
British Iron & Steel Federation ... 87
British National Electrics, Ltd. 2
British Power Transformer Co., Ltd. 28
British Thomson-Houston Co., Ltd. 31
Brush Electrical Engineering Co., Ltd. 38
Carter, B. & F., Co., Ltd. ... 86
Clang, Ltd. 84
Cressall Manufacturing Co., Ltd. 4
Crompton Parkinson, Ltd. 20, 73
Cyc-Arc, Ltd. 72
Daleman, Richard, Ltd. 74
Deco Engineering Co., Ltd. ... 84
Downes & Davies, Ltd. 54
Drake & Gorham Wholesale, Ltd. 82
Edwards F. J., Ltd. 67
Electric Construction Co., Ltd. 83
Electropower Gears, Ltd. ... 74
Electrical Times 86
Electro Mechanical Manufacturing Co., Ltd. 45
Elliott Bros. (London), Ltd. ... 79
Engineering & Lighting Equipment Co., Ltd. 10
English Clock Systems, Ltd. ... 72
English Electric Co., Ltd. 32, 75
Ferranti, Denis, Co., Ltd. ... 40
Ferranti, Ltd. 23
Fischer Bearings Co., Ltd. ... 51
Fluxite, Ltd. 82
Fry's Metal Foundries, Ltd. ... 56
Geipel, William, Ltd. 82
General Cable Manufacturing Co., Ltd. 27
General Electric Co., Ltd. 41, 77
Genristo, Ltd. 80
Griffiths, Gilbart, Lloyd & Co., Ltd. 74
G.W.B. Electric Furnaces, Ltd. ... 30
Hackbridge & Hewittic Electric Co., Ltd. 59
Hague & McKenzie, Ltd. ... 44
Hardy & Padmore, Ltd. 78
Hart Accumulator Co., Ltd. ... 70
Henley's, W. T., Telegraph Works Co., Ltd. 39
Hoover, Ltd. 58
Imperial Chemical Industries, Ltd. 9
Jackson Electric Stove Co., Ltd. 29
Johnson & Phillips, Ltd. ... 11
Kautex, Ltd. 34
Kempston Electrical Co., Ltd. ... 82
Lancashire Dynamo & Crypto, Ltd. 13
Laurence, Scott & Electromotors, Ltd. 3
Legg (Industries), Ltd. 14
Lindley Thompson Transformer and Service Co., Ltd. 25
Measuring Instruments (Pullin), Ltd. 48
Metropolitan-Vickers Electrical Co., Ltd. 17, 60
Metway Electrical Industries, Ltd. 76
Micramatic Ltd. 70
Midland Electric Manufacturing Co., Ltd. 19
M.K. Electric, Ltd. 81
Morgan, Albert 4
Moss, William, & Sons, Ltd. ... 4
Nalder Bros. & Thompson Ltd. 55
Nevelin Electric Co., Ltd. ... 90
Parmiter, Hope & Sugden, Ltd. 22
Partridge, Jones & John Paton, Ltd. 71
Partridge, Wilson & Co., Ltd. ... 86
Philips Electrical, Ltd. 15
Pinchin Johnson & Associates, Ltd. 50
Premier Cooler & Engineering Co., Ltd. 48
Reyrolle, A., & Co., Ltd. ... 8
Rigby, John, & Sons, Ltd. ... 48
Riley, Robert, Ltd. 90
Rotunda, Ltd. 84
Rowlands Electrical Accessories, Ltd. 24
Sanders, William, & Co. (Wednesbury), Ltd. 26
Scott, H. J., & Co. (Belfast), Ltd. 78
Service Electric Co., Ltd. ... 28
Siemens Bros. & Co., Ltd. ... 69
Siemens Electric Lamps and Supplies, Ltd. 21
Simmonds & Stokes, Ltd. ... 76
Simplex Electric Co., Ltd. ... 46
S.N. Engineering Co., Ltd. ... 86
Sperryn & Co. 14
Standard Telephones & Cables, Ltd. 85
Statter, J. G., & Co., Ltd. ... 84
Steatite & Porcelain Products, Ltd. 49, 68
Steel Company of Wales, Ltd. ... 43
Sturdy Electric Co., Ltd. ... 86
Sunvic Controls, Ltd. 30
Thorpe, F. W., Ltd. 54
Tilling-Stevens, Ltd. 44
Tucker, J. H., & Co., Ltd. ... 88
U.S. Metallic Packing Co., Ltd. 40
Whiteley, B. S. & W., Ltd. ... 53
Wildbore, J. E., Ltd. 28
Yorkshire Electric Transformer Co., Ltd. 47
Zenith Electric Co., Ltd. ... 76

STEATITE INSULATING

BEADS

S.P. Insulating Beads are extremely strong and fully vitrified, yet very low in price. They are now available from stock. Sizes for wire 4-18 S.W.G.

STEATITE & PORCELAIN PRODUCTS LTD.

Stourport-on-Severn. Tel: Stourport 111. Grams: Steatain, Stourport

S.P.40

A load that will carry a load.
SUBMARINE
POWER CABLE
protected with
a Special Sheath
SIEMENS
LONDON
E.W. RUDD LTD
SIEMENS BROTHERS & CO., LTD. WOOLWICH LONDON, S.E.18

HART ACCUMULATOR CO. LTD.,

Chequers Lane, Dagenham Dock, Essex

Manufacturers of

STORAGE BATTERIES FOR ELECTRIC LIGHTING AND POWER INSTALLATIONS

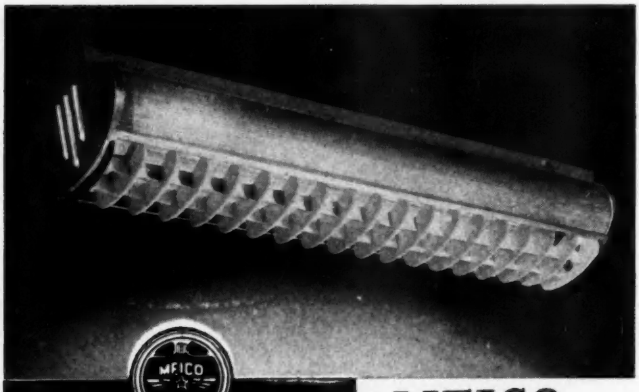
EMERGENCY LIGHTING EQUIPMENTS
for Hospitals, Cinemas, Theatres, Public Buildings, Hotels, Business Premises, Factories, Ships, etc.

PRICES ON APPLICATION

BY APPOINTMENT TO H.M. THE KING MAKERS OF ACCUMULATORS

Telephone: RAINHAM 34

Branches at Birmingham, Bristol, Cork, Dublin, Glasgow, Manchester, Newcastle-on-Tyne, Nottingham, and Westminster.



Cold Cathode establishes a special place in the field of lighting, due to their high efficiency and adaptability, with considerably longer life, instant starting, and their ability to operate on reduced supply voltage. A comprehensive range of MEICO Fittings and combinations in "U" Tubes, 3 ft. Grid and Straight Tubes. Illustrated and informative catalogues available on request.

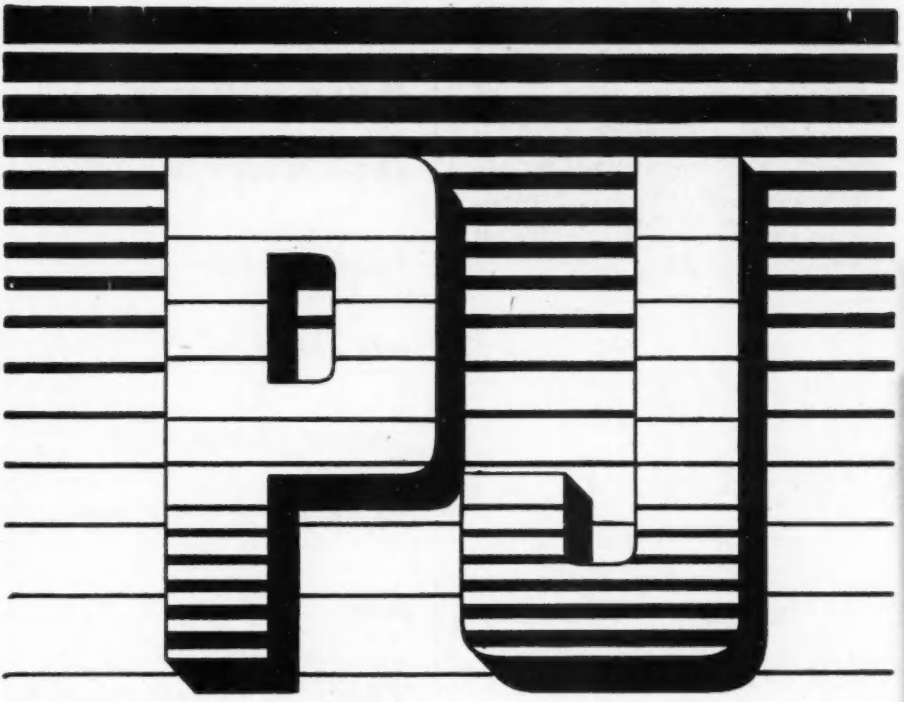
MEICO

MICRAMATIC LIMITED

WOOTTON MOUNT
OLD CHRISTCHURCH ROAD
BOURNEMOUTH

MEICO *Cold Cathode* LUMINAIRES

WORKS CONGLETON CHESHIRE
BRANCHES AT LONDON · LEEDS · GLASGOW



Steel Sheets for the

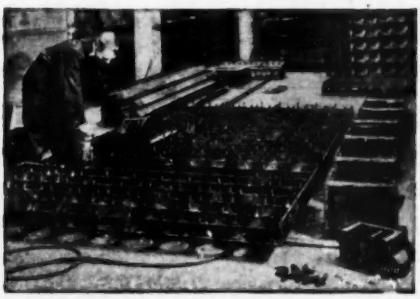
Electrical Industries

PARTRIDGE, JONES & JOHN PATON LTD

PONTNEWYNYDD, NEAR PONTYPOOL

TELEPHONE PONTYPOOL 131/2

5710



"Photograph by courtesy of Messrs. J. Howden & Co. Ltd., Glasgow"

YOU

CAN BENEFIT BY

CYC-ARC
REG. TRADE MARK

STUD-WELDING

ECONOMICAL—
Saves material and time.

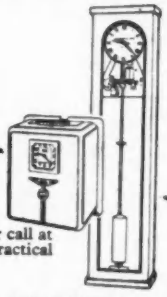
ADAPTABLE—
Aluminium, Brass and Steel studs welded with same tool.

WIDE RANGE—
$\frac{1}{8}$" to $\frac{7}{8}$" dia studs, promptly supplied.

★ ★ ★

27-29 NEW NORTH RD,
LONDON, N.1.
and visit us at
Stand C.218 B.I.F. Castle Bromwich.

When you say that* SMITHS, *famous for all time, make the finest* MASTER CLOCKS *and* TIME RECORDERS *you are absolutely accurate



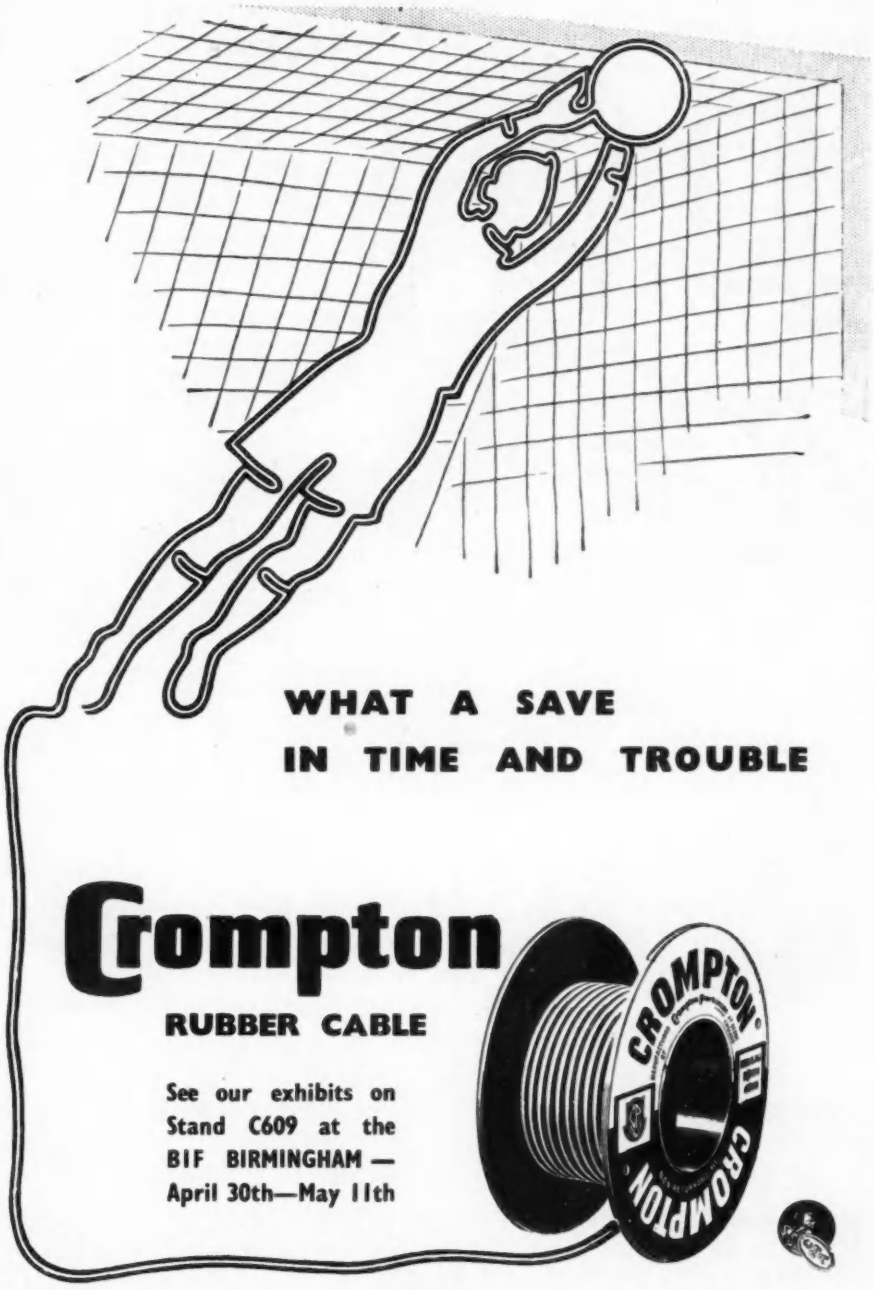
Installations may be purchased outright or arranged on rental terms. Write to us for full details, or call at our Showrooms for a practical demonstration.

ENGLISH CLOCK SYSTEMS LTD.

Speedometer House, 179-185 Great Portland Street, London, W.1. *Langham 7226.*

153-155 Bothwell Street, Glasgow, C.2. *Central 3972*

THE INDUSTRIAL BRANCH OF
SMITHS ENGLISH CLOCKS LIMITED



CROMPTON PARKINSON LIMITED, CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2
Telephone: CHAncery 3333 *Telegrams: Crompark, Estrand, London*

E

REPETITION TURNED PARTS

Repetition [turned] parts for Capstan and Automatic productions in any metal or finish or quantity. More and more keen buyers are asking GGL first. For a quick answer to *your* problem ring Birmingham, NORthern 2132

GRIFFITHS, GILBART, LLOYD & CO. LTD.

EMPIRE WORKS · PARK ROAD · BIRMINGHAM, 18

G·G·L

½ h.p. up to 27 h.p. Output Speed Range from 6 r.p.m.

Please apply for our complete range of GEARED MOTORS & SPEED REDUCERS

ELECTROPOWER GEARS LIMITED

KINGSBURY WORKS, KINGSBURY RD., LONDON, N.W.9

Tel.: Colindale 4621 3 lines Telegrams: LEKTROPOWA Cables: HYDE, LONDON

CLEARLY—

A SOUND PROTECTION

'EVOLITE'

PERSPEX TUBES & CYLINDERS

Its good electrical properties make it the safe and economical choice

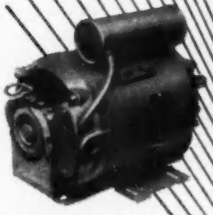
for FLUORESCENT LIGHTING IN COAL MINES, DUSTPROOF AND CORROSIVE RESISTING FITTINGS, LAMP GLASSES, etc., etc.

RICHARD DALEMAN LTD.

325/327 Latimer Road · · London, W.10

Engineers in Perspex

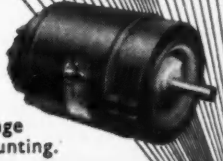
For outstanding reliability···specify
ENGLISH ELECTRIC
Fractional Horse-power Motors

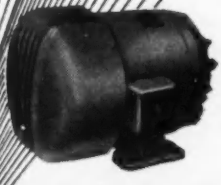


There is an "English Electric" Motor for every type of drive, and certain sizes are ex-stock.

Single phase, capacitor-start induction run; Resilient base.

Lug mounting.





Flange mounting.

Totally-enclosed, Fan-cooled. Rigid base

The ENGLISH ELECTRIC Company Ltd.
FRACTIONAL HORSE-POWER MOTOR DEPT · BRADFORD
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

NIPHAN

WEATHERPROOF METAL-CLAD PLUGS, SOCKETS SWITCH PLUGS, ETC. for all electrical purposes

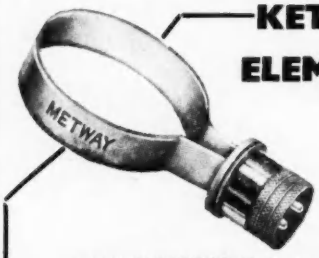
5/300 amp.
250/500 volt.

Latest Catalogue on Application.

SIMMONDS & STOKES LIMITED
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. NEW ZEALAND, Samuel Brown, Ltd., Wellington. INDIA, G.E.C. (India) Ltd., Calcutta. CEYLON, Walker & Greig, Ltd., Colombo.*

KETTLE ELEMENTS
(IMMERSION TYPE)



NON-AUTOMATIC A.C. or D.C.
Small type made in 500, 750, 1000, 1250, 1500 watts.
Standard type made in 1000, 1250, 1500 watts.

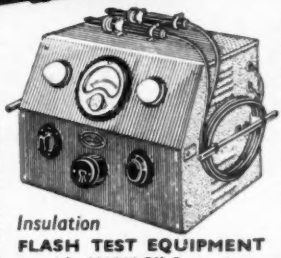
AUTOMATIC A.C. only.
(Thermostatically Controlled Type.)
Made in 1500 watts only.

AUTOMATIC A.C./D.C. (Plug Ejector Type).
Made in 1000, 1250, 1500 watts.
All types supplied with Collar.

ROUND EARTHED KETTLE CONNECTORS
(With or without flex) available for all above.
Send 6d. stamp for LIST ELE/4/E.T.

METWAY ELECTRICAL INDUSTRIES LTD.
KING STREET, BRIGHTON, 1.
Phone, Brighton 28366. Grams, 'Metway,' Phone, Brighton

Flash Testing up-to-date

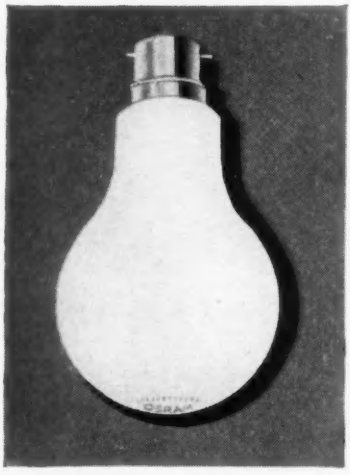


Insulation
FLASH TEST EQUIPMENT
with "VARIAC" Control
Booklet on request

It's a **ZENITH** *product!*

The ZENITH ELECTRIC Co. Ltd.
Sole Makers of the well-known "Zenith" Electrical products
Zenith Works, Villiers Rd., Willesden Green, London, N.W.2
Phone: Willesden 4087-8-9 *Grams:* Voltaohm, Phone, London

40 - 60 - 100 - -and NOW- 150 and 200 watt



Osram

SILVERLIGHT LAMPS

OSRAM Silverlight lamps in the 40 - 60 and 100 watt sizes have proved their value in the house. With the introduction of the 150 and 200 watt ratings, the efficient diffusing qualities of the Silverlight bulb are now available for industrial and commercial installations.

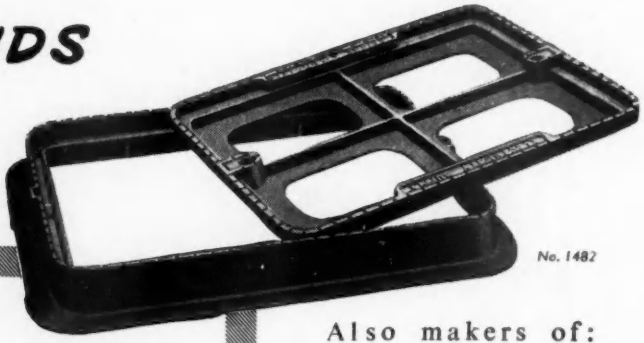
NO FILAMENT GLARE — NO HARSH SHADOWS
SOFT DIFFUSED LIGHT

Watts	Standard Cap.	List Price	Purchase Tax Extra	Total Price
		s. d.	s. d.	s. d.
40	BC	1 7	0 5	2 0
60	BC	1 7	0 5	2 0
100	BC	2 0	0 7	2 7
150	BC or ES	2 9	0 8	3 5
200	ES	4 6	1 2	5 8

NOTE.—40 - 60 and 100 watt sizes have coiled coil filaments.
Standard voltages—200, 210, 220, 230, 240, 250, 260.

THE GENERAL ELECTRIC COMPANY, LIMITED, MAGNET HOUSE, KINGSWAY, LONDON, W.C.1

THOUSANDS have been SOLD...



No. 1482

ROUND CORNERED PAVEMENT COVERS AND FRAMES

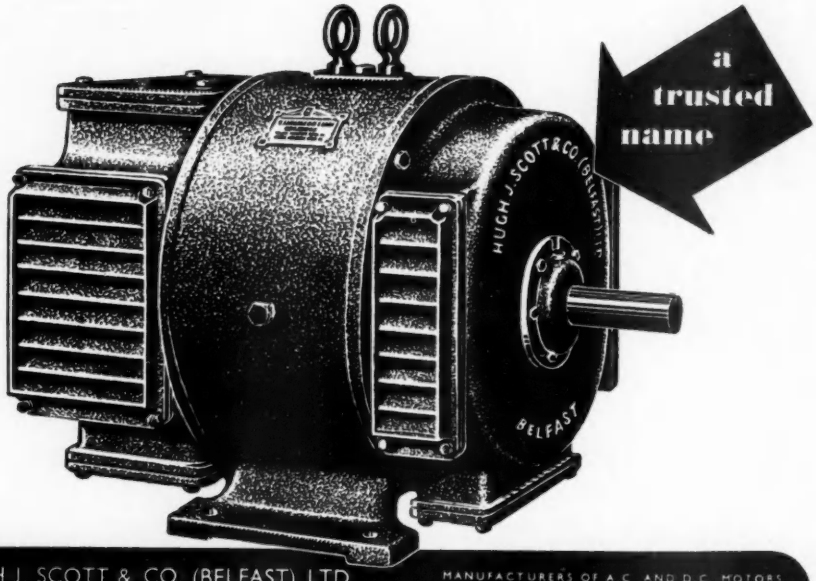
16 Standard Sizes

Also makers of: Roadway Covers and Frames · Lamp Pillars and Brackets · Kiosks and Pillar Casings

ESTABLISHED 1814

HARDY & PADMORE LTD., WORCESTER. Tel: WORCESTER 3215

M-W.101



HUGH J. SCOTT & CO. (BELFAST) LTD
VOLT WORKS · BELFAST · N. IRELAND

MANUFACTURERS OF A.C. AND D.C. MOTORS AND GENERATORS UP TO 200 H.P.

Whenever light is needed . . .

The ELLIOTT LIGHTING CONTROLLER *switches on automatically*

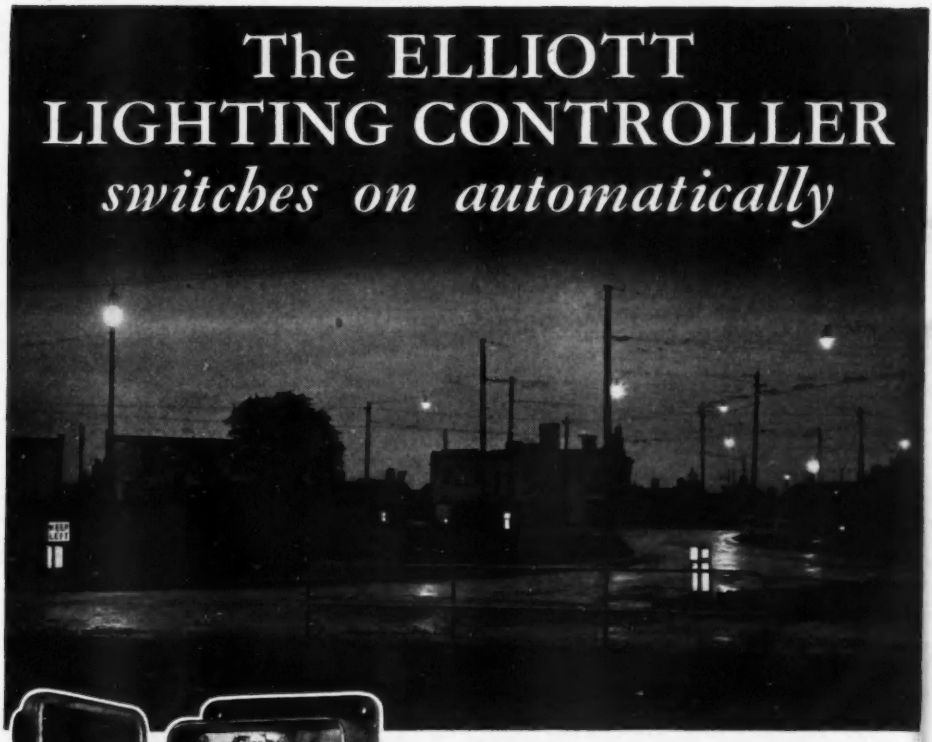


Photo by courtesy of Nottingham Corporation Lighting Committee

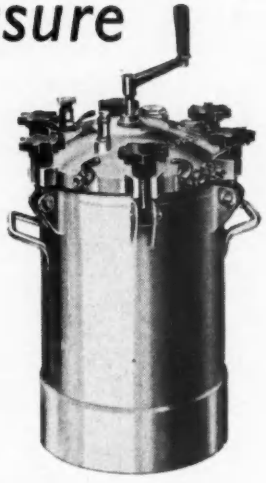
Reliability and simplicity are the keynotes of the Elliott Lighting Control System, which switches on whenever low light values occur, not only at night, but also during daylight storms and fog. The system is particularly suitable for remote islands, crossings, etc., as it requires no routine maintenance or resetting. Operation is by means of a barrier-layer photocell and magnetic amplifier—no valves are employed.

The Elliott Lighting Controller has innumerable applications in industry, for factory lighting, harbour and dock lighting, railway yards, etc. Send for full details.

ELLIOTT AUTOMATIC LIGHTING CONTROLLER

ELLIOTT BROTHERS (LONDON) LTD., CENTURY WORKS, LEWISHAM, LONDON, S.E.13 • TIDeway 3232

AERASPRAY TRADE MARK Pressure Feed Containers

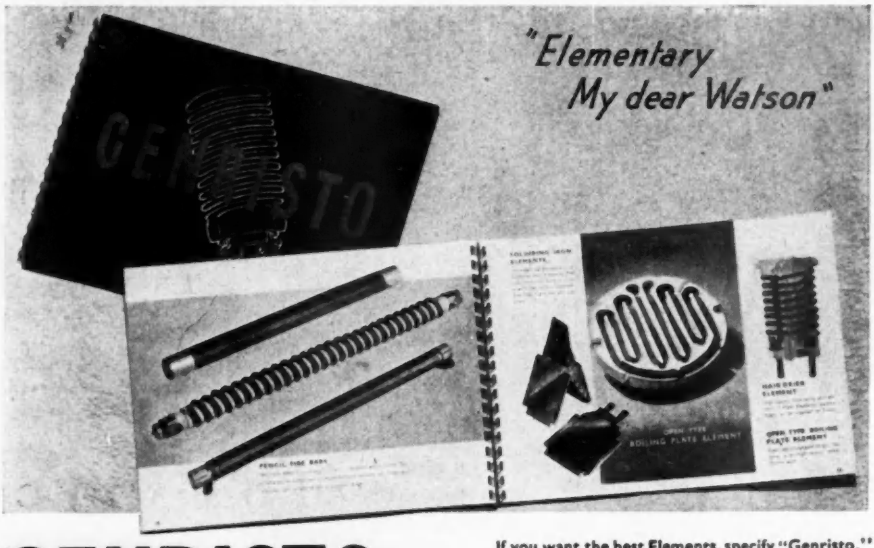


These new Pressure Feed Containers have features which will readily be appreciated by the experienced user. Pressure regulating valve, gauge and safety valve are built into the cover to give protection from damage and the smooth exterior makes cleaning an easy job. The quick action cover (secured by bakelite covered hand-wheels) is of aluminium alloy, reducing weight to a minimum, and the cocks are arranged to give proper hose grouping. Working pressure is quickly set and accurately maintained. They fully conform to B.S.S.1101.

Write for Special Literature EL451

B.I.F.
BIRMINGHAM
APRIL 30th
—MAY 11th
STAND D.734

AERASPRAY MANUFACTURING CO. LD.
Makers of Spray Guns, Single & Multi-Stage Air Compressors, Fume Exhaust Systems, Automatic Spray Finishing Systems.
Head Works & Offices: Nechells, Birmingham 7; 1 Victoria St. London, S.W.1. Also at Glasgow, Manchester, Belfast, etc.



GENRISTO LTD

If you want the best Elements, specify "Genristo." And a most useful first step is to send for the "Genristo" Catalogue, a handsome and useful booklet. Enquiries on business letter headings only.

OSMASTON STREET, NOTTINGHAM

List No. 727

NOW – M.K. 13 amp Switchsocket-outlets

List No. 2959

From the makers of Britain's best switchsockets comes a new range in the old tradition. These 13 ampere units with fused-plugs to B.S. 1363 : 1947 incorporate all the well-known M.K. features.

* Self-adjusting spring-grip socket contacts.
* Original M.K. "Anti-Flash" shutters.
* Non-track heavy section mouldings of Urea.
* Slow break high-efficiency switches conforming with the tests of B.S. 1299 : 1946.
* Pure silver contacts.
* Silent operation.
* Good proportions and compact dimensions.

Also in this range :—

List No. 2957 — 13 amp. Flush all-insulated switchsocket to fit B.S.1299 Boxes.

List No. 2977 — 13 amp. Surface metalclad switchsocket in drawn steel seamless box.

M.K. ELECTRIC LIMITED

WAKEFIELD STREET, EDMONTON, LONDON, N.18

Telephone : Tottenham 5151 (6 lines). *Telegrams* : Multiconta, Southtot, London

A.38

WHAT ARE YOUR REQUIREMENTS ?

are they

LAMPS
•
CABLES
•
SWITCHGEAR
•
WIRING ACCESSORIES
•
WATER HEATING APPLIANCES
•
ELECTRIC LIGHT FITTINGS
•
DOMESTIC APPLIANCES
ETC.

If so, don't hesitate to send your enquiries to us

EARLY DELIVERIES

DRAKE & GORHAM WHOLESALE LTD.
77 LONG ACRE, LONDON, W.C.2
Telephone: TEMple Bar 3993
MANCHESTER—29 Piccadilly.
BRIGHTON—80a Queens Road.
GLASGOW—182 St. Vincent Street.
BRISTOL—2 & 4 Church Street, Temple.
DUBLIN—2 Church Lane, College Green.
Midland Representative:
W. T. BOWER, 184 Jockey Road, Sutton Coldfield

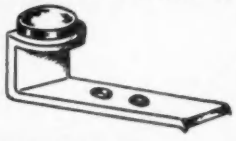
"THE FLUXITE QUINS" AT WORK
"Here's a job that FLUXITE won't funk,
Slick work will save this old junk,
Ship repairs at top speed,
At this moment of need.
If I don't beat this swordfish we're sunk!"

For all SOLDERING WORK—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned." For the jointing of lead—without solder; and the "running" of white metal bearings—without "tinning" the bearing. It is suitable for ALL METALS—excepting ALUMINIUM—and can be used with safety on ELECTRICAL and other sensitive apparatus.
With Fluxite, joints can be "wiped" successfully that are *impossible by any other method.*
Used for over 40 years in Government works and by leading Engineers and Manufacturers. OF ALL IRONMONGERS in tins—from 1/- upwards.
THE FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 2/6 or filled 3/6.

FLUXITE
SIMPLIFIES *ALL* SOLDERING

Write for leaflets on case-hardening steel and tempering tools with FLUXITE, also on "Wiped" joints. Price 1d. each
FLUXITE LTD. (Dept. E. T.), Bermondsey St., S. E.

SPARE PARTS FOR ALL MAKES OF AMERICAN CONTROL GEAR
May be obtained from



KEMPSTON ELECTRICAL Co. LTD.
KEMPSTON **BEDFORD**

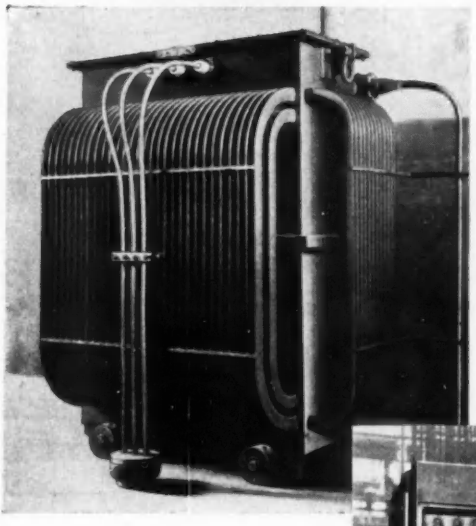
V.I.R. BRAIDED

LEAD & T.R.S.

WILLIAM GEIPEL LTD.
156-170 BERMONDSEY ST., S.E.1
FOUNDED IN LONDON 1871

PROVIDING ESSENTIAL SUPPLIES

STATIC TRANSFORMERS AND MERCURY-ARC RECTIFIERS



(ABOVE) One of two 1,000 kVA 11kV/400-230 volt Stepdown Transformers, at Frankley pumping Station Birmingham.

(OPOSITE) A Mercury-arc rectifier providing a 300 amp. general load in a works Substation.

ESTABLISHED 1882

THE ELECTRIC CONSTRUCTION CO. LTD

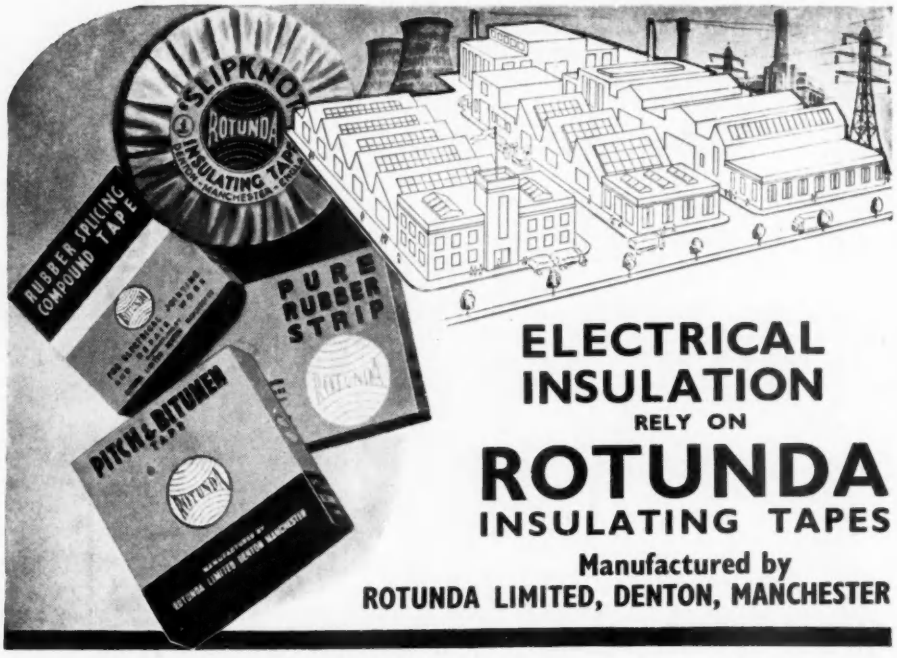
Head Office and Works

TELEGRAMS ELECTRIC WOLVERHAMPTON BUSHBURY ENGINEERING WORKS WOLVERHAMPTON TELEPHONE WOLVERHAMPTON 21455 (7 LINES)

Manufacturers of Electrical Machinery, Switch and Control Gear, Transformers and Rectifiers.

London Office: 61 Catherine Place, Westminster, London, S.W.1

Telephone: VICtoria 3482-3



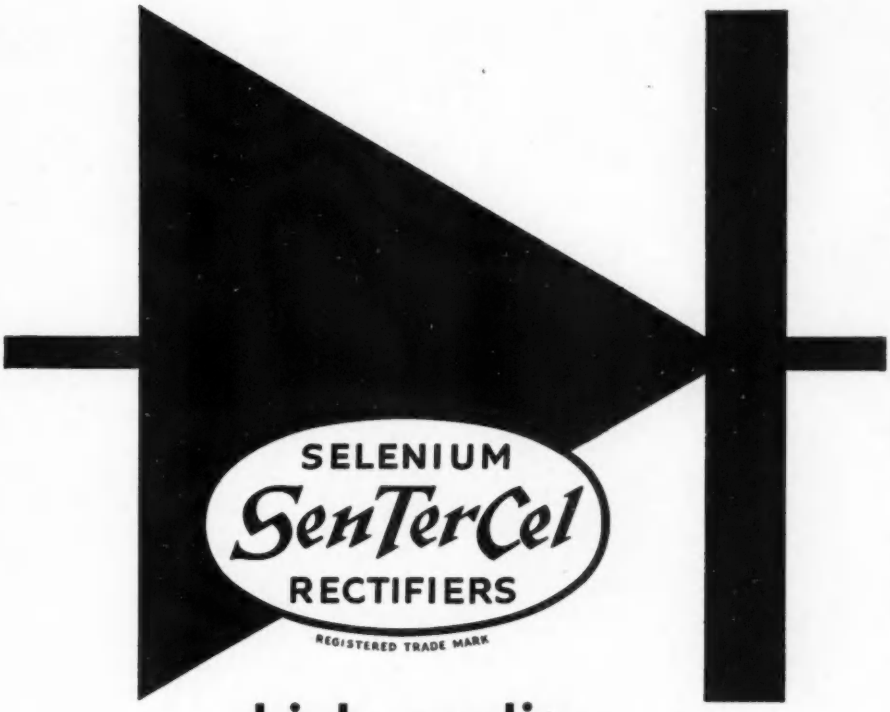
ELECTRICAL INSULATION
RELY ON
ROTUNDA
INSULATING TAPES
Manufactured by
ROTUNDA LIMITED, DENTON, MANCHESTER

DECO CABLE REELING DRUMS
for all moving structures

DECO Electrical Products include
Contact Collector Columns, Limit Switches, Overhead Collector Equipment, Winch Limiting Mechanisms for Skip Hoists, Cranes and Mechanical Handling Plants, Cable Reeling Drums
DECO ENGINEERING CO. LTD.
West Row, N. Kensington, London, W.10 Ladbroke 3066-7
P370

WELL AHEAD OF THE REST
CLANG ELECTRICAL ACCESSORIES
CLANG
LIMITED
CROWN YARD, CRICKLEWOOD
N.W.2 Tel.: Gladstone 4201

SWITCHGEAR SPECIALISTS
STATTER
J. G. Statter & Co. Ltd., 82 Victoria Street, S.W.1

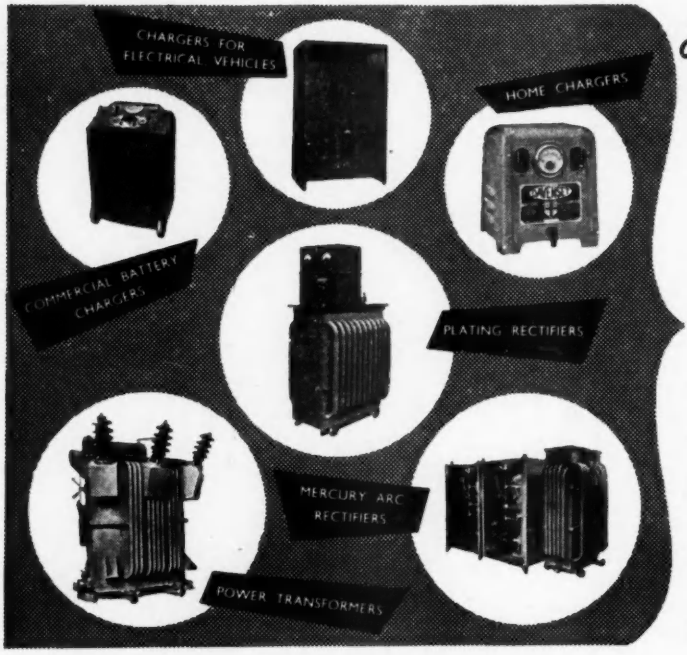


high quality
rectifier equipment
for industry

Standard Telephones and Cables Limited

Registered Office : Connaught House, Aldwych, London, WC2

RECTIFIER DIVISION: Warwick Road, Boreham Wood, Herts.
Telephone: Elstree 2401 Telegrams: Sentercel Borehamwood



In the Service of Industry

The Davenset range of electrical equipment is designed for the needs of industry. It consists of Power Transformers up to 500 kVA, Mercury Arc and Selenium Rectifiers for battery charging, plating, precipitation, etc.

We specialise in the design and construction of all types of electrical equipment built to suit our customers individual requirements.

Please send now for free copies of Booklets Nos. 207, 214 and 217.

DAVENSET

INDUSTRIAL ELECTRICAL EQUIPMENT

Built from the First to Last

PARTRIDGE WILSON & CO. LTD.
Davenset Works · Leicester

TRANSFORMERS

for special applications immediate 'Sturdy' service

All types 50 V.A. to 25 kV.A. For test gear, switchboards, control panels, furnaces, etc. Built to your specification.

Performance and Manufacture fully guaranteed.

Quotations by return.

STURDY ELECTRIC CO LTD

Burnopfield ('Phone 237) Newcastle-on-Tyne

BENT TUBES, PIPES & CONDUITS

Whatever your particular needs may be—in BENT TUBES—we will gladly place at your disposal the value of more than 25 years' practical experience of tube bending.

S.N. ENGINEERING CO. LTD.
3a Alsen Place, London N.7 *Phone: ARChway 2248*

INSTRUCTION CHART

For dealing with apparent death from

ELECTRIC SHOCK

(In accordance with H.O. Electy. Reg. 29)

Mounted on strong board, varnished and corded for hanging

Price 3/- plus 10d. postage (per single copy)

ELECTRICAL TIMES

Sardinia House, Sardinia St., LONDON, W.C.2

RATCHET & REVOLUTION COUNTERS

PLEASE SEND FOR LEAFLET No. 18/6

Speeds up to 6,000 r.p.m

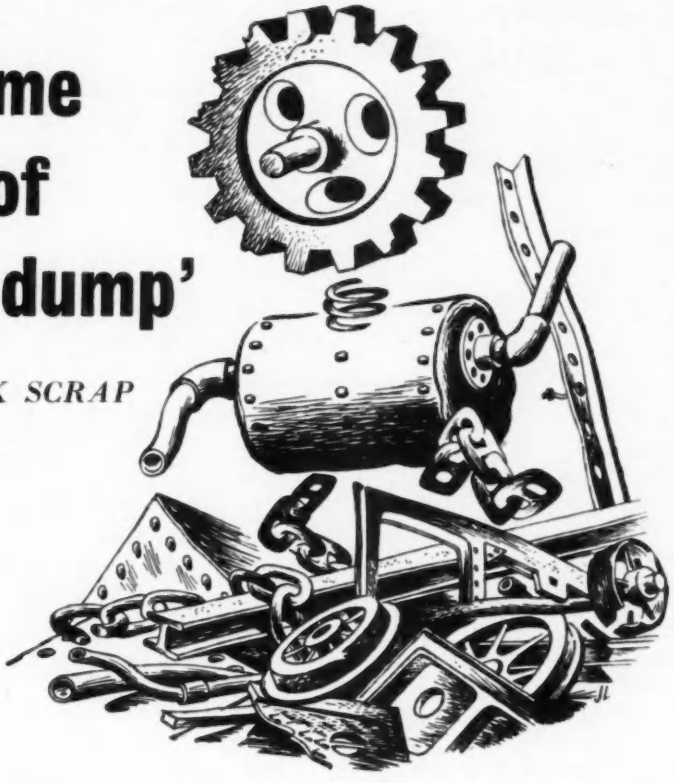
SOLE MAKERS AND PATENTEES:—

B. & F. CARTER & CO. LTD.
BOLTON, 9

Members of B.E.S.T.E.C. Organisation

'Get me out of this dump'

says JACK SCRAP



How many tons of iron and steel scrap would you find in odd corners if you had a thorough search made?

Find that scrap, round it up, turn it in. Every ton of scrap that gets back to the steelworks will make a ton of new steel.

✱ **Scrap Merchants are glad to help with dismantling and collection.**

WANTED
from the
ELECTRICAL INDUSTRY

Old engines and transformers and *every kind* of general and process scrap and obsolete plant.

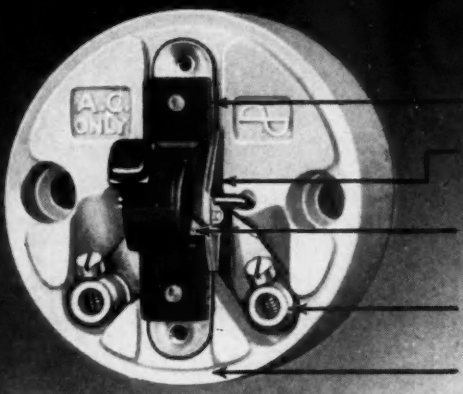
SPEED THE SCRAP SPEED THE STEEL

Issued for the STEEL SCRAP DRIVE by the

British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1

T.3

Every feature designed for greatest efficiency



QUIET OPERATION
RUBBER SILENCERS

FLASHPROOF SWITCHING
SHORT SLOW BREAK MOVEMENT

PORCELAIN ROLLER
DUAL INSULATION FEATURE

EASY WIRING
LARGE ACCESSIBLE TERMINALS

MAXIMUM INSULATION
PORCELAIN BASE SHROUDS
LIVE PARTS

Attractive modern appearance combined with "quality" performance make Tucker B66 5 amp A.C. Switches the first choice for domestic, office and showroom installations.

A feature worthy of special consideration is the dual insulation provided by the use of porcelain for both actuating roller and base.

Tucker

B66 5 amp. A.C. SWITCH

Available in flush mounting form with plates for B.S. 1299 box (Home Trade) or with plates for American Box (Export)

Tucker TELAC

J. H. TUCKER & CO. LTD., Kings Road, Tyseley, Birmingham 11

Specialists in A.C. Switching Technique since 1935
Makers of First Grade Electrical Accessories for 57 years

London Office : 2 Newman Street, W.1

Agents in Madras: Simpson & Co. Ltd., 202/3 Mount Road, Madras 2

Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts., and published at Sardinia House, Sardinia Street, London, W.C.2. April 5, 1951.

Only the best

Throughout most parts of the world ASHTON CABLES and Flexibles are giving dependable service in home and industry. Whatever the application *only the best is good enough*, that is why you should insist *always* on 'ASHTON'.

ASHTON CABLES are manufactured at our Castle Works under strict laboratory control and to Specification B.S.S. No. 7. 1946. Amendment No. 3, August 1949. P.D. 947.

Catalogues and Sample Cards on request

ASHTON

CABLES AND FLEXIBLES

MADE BY AERIALITE LTD., STALYBRIDGE, CHESHIRE, ENGLAND

Springs by

RILEY

FAMOUS SINCE 1821

ROBERT RILEY LTD. MILKSTONE SPRING WORKS ROCHDALE

TELEPHONE ROCHDALE 2237 (4 LINES) TELEGRAMS 'RILOSPRING' ROCHDALE

Nevelin

RECTIFIERS

in all sizes

Have—

★ STURDY CONSTRUCTION
★ LOW MAINTENANCE COST
★ COMPLETE RELIABILITY
★ STATIC OPERATION
★ LOW INSTALLATION COST

and

★ PROMPT DELIVERY

One of the DH *Group*

NEVELIN ELECTRIC COMPANY LTD.

PURLEY WAY CROYDON SURREY

Telephone: CROydon 3366 Telegrams: NEVELIN, CROYDON